STWP REVIEW

JULY 1960

Volume 7 Number 3

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A NOTE TO CONTRIBUTORS

Contributions to the *Review* are always welcome; short articles of 500 to 1000 words are most easily fitted into our small magazine.

Send the original on heavy white bond paper, typewritten, double or triple spaced, plus two carbons. Leave at least a 1-inch margin on all sides, number the pages consecutively, and be sure that all illustrations are keyed to the text.

Articles should not exceed 2500 words plus three illustrations.

We assume that every article is approved by your company before it is submitted. The authors' names and affiliations should be on the manuscript. A short biographical note is most helpful. This note should include the present title of the author, the full name of his organization, and complete information about books, other articles, or any other publication credits. Please address all contributions to the Editor; the Review Committee will read your article and our publication plans will depend on their collective judgment.

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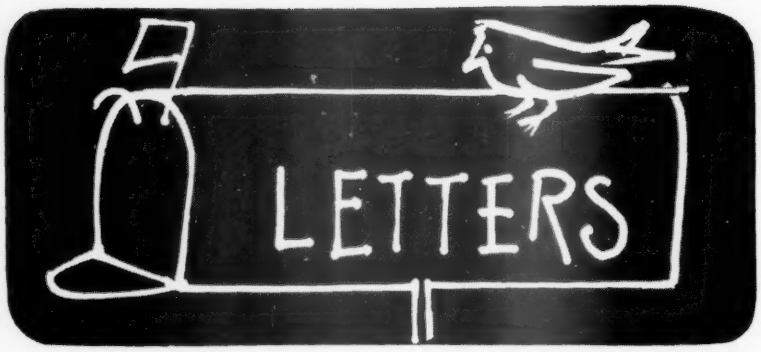
REPRINTS

Reprints are available, in quantities of 100 or more, from the John S. Swift Company, 2524 Spring Grove Avenue, Cincinnati 14.



To Editor, *STWP Review*:

I have been a senior member of the STWE organization since its inception and am using my first opportunity to write you for your recommendations on a good suitable dictionary for an engineer engaged in Farm Tractor Technical Writing. Webster's New International Dictionary Second Edition is always available to us; however, we had thought that a dictionary directed more to the mechanical and electrical engineer would be of definite value . . .

We here at the Charles City, Iowa, Plant of The Oliver Corporation manufacture only wheel type agricultural and industrial tractors. We have about seven technical writers at the present time who devote their time strictly to technical publications. I have enjoyed reading the *Review* since it first came out and I pass it along to both our Service and Engineering Departments. Like all good things you have to separate the wheat from the chaff in order to get the parts that directly concern us; however, getting a broader scope of technical writing also helps one to do a better job in his own particular field.

George R. Gregg
The OLIVER Corporation
Charles City, Iowa.

To Editor, *STWP Review*:

I have read with interest the article in your April, 1959 issue, describing Technical Writing in Great Britain. I am afraid I cannot agree with your contributor, Alvin Allen. The most important point I must make is to contradict the statement made by Mr. Allen that there is no Technical Writing Company in Great Britain. This is far from true. This Company alone employs 150 personnel and included amongst these are 45 experienced Electronics Authors. Technivision is not alone in the field. Our main competitor has been established in this business since 1928. It is a pity that Mr. Allen did not visit the Publications Sections of some of Great Britain's outstanding aircraft and missile manufacturers. I am quite sure that he would have seen much to impress him and I am sure that he would not have decided that Technical Writing in Great Britain is 20 years behind that of the United States and that the Technical Writing field is only starting to get under way. Again, Mr. Allen states that the preparation of Military Handbooks is considered a Government function and only prepared through Her Majesty's Stationery Office. This is just not true. This Company alone produces many Handbooks of a secret nature. Quite apart from this, most industrial concerns prepare their own Handbooks. Again, the correspondent states that there is a lack of demand for formal military instruction manuals. This is again not true. The Services of Great Britain stipulate that all manufactured products supplied to them must have comprehensive supporting literature.

I am sorry that we never had the chance of meeting Mr. Allen when he was in this country, but should he return, we should be delighted to show him round our Organisation. The same applies to any other members of your Society.

Incidentally, I myself will be visiting the United States in June of this year, probably staying in New York. I should very much like to have the opportunity of making your own acquaintance and learning more about the STWE. We are extremely interested in your *Review* and have taken out a subscription to this.

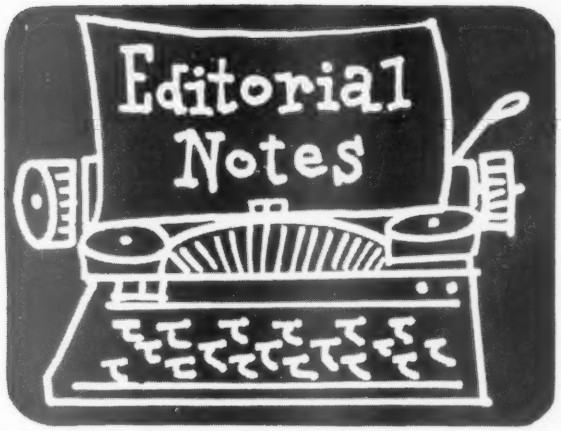
A. Dacre Lacy
Managing Director
Technivision Limited
Braywick House
Nr. Maidenhead, Berks, England

To Editor, *STWP Review*:

The magazine gets better and better and is a real help in teaching. Some time I would like to see a series of different formats for teaching report writing, especially experimental courses which have proved successful.

Margaret D. Blickle
28 Indian Springs Drive
Columbus 14, Ohio

(*Continued on Page 34*)



The April convention has come and gone, and all of us can look forward to a growing organization joining the Society of Technical Writers and Editors with the Technical Publishing Society. This journal will remain as the common voice of the organization.

For many months, this editorial space has been devoted to topics other than editorials to bring the greatest possible amount of individual opinion to the membership. While it is not always apparent, there have been some major changes in the magazine over the last year and a half. Biographical sketches, for example, are no longer used since apparently the same people are always part of our hard-working group of officers, and most of them are well known by now. We have expanded the letters column to include short articles and technical notes of various types which would not normally appear as articles.

The section devoted to book reviews has been under a serious discussion. Occasionally we are criticized because we review books that have nothing to do, in content, with technical writing and editing. However, we feel that our membership comes from many different industrial fields and represents a wide area of interest. For this reason we will continue to review books ranging in coverage from the principles of helicopters to the geology of drilling for oil. It is important to technical writers, we feel, to examine books in fields other than their own to see how they are written, how they are illustrated, and how they are constructed. It is part of our policy to include rather lengthy book reviews when we feel them to be of interest to a wide segment of our membership.

Our articles have three basic sources. Many are original papers which were solicited or unsolicited on topics we feel are of wide interest. As a part of the editorial function, we have requested people to write articles; the excellent piece that Joel Shulman did on *The Anonymous Technical Writer in History* is an example.

We are also anxious to reprint articles that have appeared in other journals. The reasoning here is to bring to the attention of our membership what we consider to be significant material presented in magazines that very few members might see. We earnestly solicit your suggestions of articles that have appeared in other magazines which you believe to be useful information for our society.

The third source of our material are the talks which are given before chapter meetings, regional meetings, or formal symposia. Since it is impossible for even our astute Editorial Board to know of all of this wealth of information, we again appreciate knowing of outside papers which have been delivered verbally and which we might have the privilege of printing.

The Editorial Board is also concerned with articles of more than routine interest. We like to bring to light the original research being done on technical writing as at Rensselaer Polytechnic Institute. Articles concerned with graphic arts and the industrial management of technical writing groups are difficult to find. The Editorial Board also is looking for articles in which the theme is the similarity of many types of nonfiction writing. The technical writer has many common bonds with other writers, and we would like to strengthen these rather than draw apart as a group to ourselves.

At this writing, our journal is being prepared in two different cities. The editorial direction still resides in Cincinnati, but the actual production editing and the real hard work of putting together an issue have gone to Pittsburgh together with Stan Higgins, our assistant editor.

We look forward to your continuing interest as our journal matures with our profession.

ALLAN LYTEL

Preparation of Ordnance Publications for Guided Missile Systems*

Frank E. Napper

To set the stage for this discussion, we must first consider the organization and mission of the Ordnance Corps as it pertains directly to the subject matter. The Chief of Ordnance, located in the Pentagon in Washington, is responsible for the design, development, and procurement of weapons systems for the Army. He is also responsible for providing the logistic support required for those weapons after they have been placed in the hands of our tactical forces. This logistic support is more commonly referred to as maintenance and supply, of which Ordnance publications play an important role. This over-all Ordnance mission is sometimes referred to as all of the things necessary and required from "birth to death" of an Army weapon, including disposal of the scrap after it is declared obsolete.

Because of the scope and complexity of this mission, the Chief of Ordnance has divided its execution into several segments on a commodity basis. Each of these segments is charged with a mid-management function for that particular commodity. For example, vehicles are managed by the Ordnance Tank-Automotive Command, ammunition is managed by the Ordnance Ammunition Command, and the missile business is managed by the Ordnance Missile Command. The organizational element of the Army Ordnance Missile Command which I represent is the Field Service Division of the Army Rocket and Guided Missile Agency. That portion of responsibility pertaining to maintenance and supply of guided missile systems in the field is assigned to the Field Service Division. The execution of this responsibility is greatly dependent upon good Ordnance technical publications, the accepted means of communication between the designer and the user and those elements involved in supporting the user.

PUBLICATION REQUIREMENTS

Before describing in some detail how we prepare Ordnance publications, let us examine the requirement. This may be stated as those supply and maintenance manuals which clearly describe the equipment in terms of functional elements or cataloging criteria, couched in verbiage easily understood by the reader, and above all, available concurrently with the issue of hardware. Thus it is easily stated but extremely difficult to achieve.

One of the first lessons that Ordnance had to learn was that the guided missile was a new commodity having some new peculiarities heretofore unencountered with more conventional weapons. These include:

1. Complexity.

2. The association of dissimilar technologies, such as electronics, hydraulics, hypergolics, explosives, and mechanical items, all within a single end item.

3. Telescoped programs where research and development overlaps production and where tactical requirements insist on readiness dates that are nearly impossible to meet.

Because it was a new field of endeavor, there were few, if any, experts to whom to turn for sage advice. Thus many of our techniques, which we use today in developing good technical literature, came through bitter experience and profitable mistakes made with the fielding of our first weapon systems.

PUBLICATION PROCEDURE

With this brief background in organization and mission and statement of the requirement, the publication procedure developed by Ordnance in support of missile systems will now be considered.

Our first action is to prepare a contractual package for publications which outlines in detail, to the prime contractor developing the missile system, the documentation requirements as in Table 1. It is essential that these requirements be specifically delineated in both the development and the production contracts. Otherwise, and we have had this experience, the most conscientious contractor, if given the opportunity, will

*Presented at the STWE Sixth Annual Convention, Washington, November 17-18, 1958.

spend his effort producing hardware instead of paper and hardware. It is much more glamorous and probably more remunerative.

The next step after contractual negotiations are completed is to provide for a detailed cross-leveling of information between the contractor or writer and the customer, in this case Ordnance. Too many times this is a one-way street, and the military are prone to sit back and expect the writer to interpret the miliary requirements, understand the environment under which the publications will be used, develop the maintenance philosophy, and understand thoroughly the level of training of the individual who will ultimately use the books. Actually, all that we in the military can rightfully expect of our contract writers is an intimate knowledge of the technical details of the equipment being covered. Thus our task is divided into two broad categories, each dependent upon the other.

Table 1 — Publication Procedure

1. **Contractual Package**
2. **Cross Leveling of Intelligence between Writer and User**
3. **Participation During Design Phase**
4. **Preparation of Maintenance Philosophy**
5. **Selection of Geographical Location for Manuscript Writing**
6. **Preparation of the Maintenance Package-Maintenance Allocation Chart**
7. **Final Concurrence at Central Location**
8. **Coordination of Supply and Maintenance Manuals**
9. **Expedited Printing and Distribution**

INTERCHANGE OF INTELLIGENCE

If the interchange of intelligence indicated is to take place, one must start early in the development phase. Toward this end, the Field Service Division published the basic Maintenance and Supply Philosophy under which systems are to be supported in the field. This is a broad matrix into which specific pieces will later be fitted. We have made special presentations to assembled members of our prime missile contractors to acquaint them thoroughly with this philosophy. The next step was to select a geographical location where representatives of Ordnance, the user (Artillery), and the contractor could meet and start the publication effort. In studying all of the factors in this respect, the Ordnance Proving Ground for Guided Missile Systems, White Sands Missile Range, New Mexico, was chosen. The reason for this choice was that this is the first place where early research and development models take shape and are actually fired. It is here and immediately adjacent that the Anti-Aircraft and Guided Missile Center of Ft. Bliss, Texas, performs user tests and trains their tactical troops. Thus in one location we can assemble the personnel who develop the item, those who support it, and those who use it. By this physical association, continuous coordination and interchange of intelligence can occur. Obviously this intelligence can be geared to the latest design changes as they appear.

This physical intermingling of the various agencies involved was no simple task. It is human nature that everyone prefers to work in familiar surroundings. To overcome this, it was found necessary to write into the publication package, mentioned earlier, the requirement that the publication contractor would conduct the major portion of his writing effort at White Sands Missile Range. At first this technique met with strong resistance, for it is no easy task to move writers from their homes and establish them in a desert 50 miles from the nearest civilization. However, for each contractor who has actually gone through this cycle it can be honestly stated that the benefits greatly outweigh the inconveniences experienced. Their task is much easier by immediate contact than it would be by coordination from separate locations. This alone probably contributes more to realizing publications concurrently with production of equipment than any one single factor.

MAINTENANCE EVALUATION

The location of this integrated team is only one step. If the myriad of details required in our publications is to be realized, a step-by-step analysis of the equipment must be made. We refer to this process as the maintenance evaluation. In the past, with conventional Ordnance equipment, it was customary to perform the maintenance evaluation after design was finalized and before production was started. This orderly process could not be followed in missile production because of the cost involved, the time required, and the telescope programming, where production is being readied during the research and development phase. So if the technical writer is to be furnished the proper subject matter to write about, he must be furnished with the "blueprints" to build from. By having Ordnance and the contractor use the prototype test model of the missile system jointly, this blueprint or maintenance evaluation package is formed. We call this a "maintenance allocation chart."

A maintenance allocation chart is a detailed breakdown of a major item into assemblies, subassemblies, and individual piece parts. Each piece is then categorized in terms of the maintenance philosophy as to whether it is repairable at the most forward location in combat, at a more rearward location, or back in the United States in our fixed Ordnance shops. Each assembly and subassembly is analyzed for the parts required to effect repair, and finally the tools and test equipment are specified. This maintenance evaluation

package is voluminous, and it is subject to constant change during the early stages. However, the secret of success is to have present those representatives of the organizations involved who can recognize these changes and make final decisions without time-consuming referral to higher headquarters. The maintenance allocation chart thus becomes the official paper, concurred in by representatives of the contractor, Ordnance, and the user. One other important factor in this technique is that maintenance procedures reflected in technical publications are in harmony with supply publications, since the same basic blueprint is the original source of each. Thus, with the presence of technicians, hardware, and writers, publication manuscripts concurred in by all concerned evolve.

Our supply publications, although tied directly to the maintenance evaluation package, are physically prepared "in house" at Redstone Arsenal. It is there that the parts selected for repair are translated into the federal cataloging system. Tentative lists are subjected to standardization action, which in effect matches new items with items already in the supply system to preclude duplication and overstockage. After proper description of the item, it is forwarded to the Department of Defense for assignment of a federal stock number. Only then can it be translated into a definitive procurement order to be bought and placed in our depot supply system.

PUBLICATION INNOVATIONS

Some innovations in the supply publication area are worthy of mention. Each item or repair part is maintained in a master file engraved on Addressograph plates. All changes, additions, or deletions, including changes in stock numbers and descriptive nouns, are recorded on these plates. The effectivity among the various missile systems is also indicated so that maximum interchangeability is realized. By this means, a manuscript copy of any specific supply catalog can be assembled and printed within 48 hours. As a further refinement of this method, and to handle the increasing volume in the missile field, we are converting our cataloging system to automatic data processing utilizing electronic computers.

PUBLICATION AND DISTRIBUTION

Thus far only those processes involved in the preparation of supply and maintenance manuscripts have been described. The task of publication and distribution must also be geared to a tight schedule if concurrency is realized. Industrial firms and agencies connected with publication writing for the Army have all had experience with printing and publication through the Adjutant General and the Government Printing Office. Many are ready to criticize that agency for the time required for printing and distribution. Our experience in the missile field has been quite the contrary. The Adjutant General, recognizing the urgency attendant to the guided missile field from a tactical standpoint, has instigated a priority system for these publications. By special handling, *manuscripts that are presented for printing have been published in volume and distributed world wide in three weeks.* This is an amazing accomplishment and one which cannot be equaled by any individual effort over any protracted period. The close coordination and cooperation of that agency completes the final chapter in our publication race against time.

To clarify the foregoing description of the broad process of developing Ordnance missile publications, the procedure will now be applied to a specific missile system, with examples of the results. Consider the Nike-Hercules surface-to-air antiaircraft missile system. It is now deployed within the continental defense areas and is also operational in an overseas theater in an active role. It is a complex system consisting of eight major items and numerous ancilliary items, and it is composed of well over a million bits and pieces. The procedure described earlier was used to produce 63 technical manuals and 71 supply manuals, which totaled 1200 pages. When all of the details of publication coordination are considered, as well as the fact that these books were available concurrently with the hardware, no mere accomplishment is represented. The feasibility of this technique is further proved by the fact that other missile systems under our control at Redstone Arsenal are approaching weaponization in the immediate future. The publications for these weapons will also be available concurrently with issue to the troops.

CONCLUSION

Although the system outlined is logical and workable, it does not eliminate the tremendous task of conveying detailed and complicated trouble shooting procedures through the printed pages. The ability to express technical details that can be absorbed by soldiers of average intelligence is a real science in which a shortage of writers is an ever-present problem. More emphasis must be placed on the technology of automation within our test equipment to eliminate decision by the operator and maintenance technician. Toward this end, we in the Ordnance Corps are developing automatic universal test equipment which can be used to fault-isolate any missile system and which utilizes digital and analog computers for decision making, rather than depending upon a human decision in-

spired by printed instructions. Although this type of approach might be considered as contributing to the extinction of technical writers and editors, history has proved that automation has improved our way of life and has not rendered the multitude jobless. Ω

About the Author . . .

LT. COL. FRANK E. NAPPER *is presently assigned as Chief, Field Service Division, Army Rocket and Guided Missile Agency, U. S. Army Ordnance Missile Command, Redstone Arsenal, Alabama. He entered federal service with the Illinois National Guard in 1941 and was commissioned in the Ordnance Corps in July 1942. He served in the Middle East Theater as Ordnance Maintenance Officer and in the European Theater during World War II as Maintenance Officer in the Ordnance Section, Headquarters First U. S. Army. After World War II, he served in the Ordnance Section, Headquarters CONARC, and as Ordnance Officer with the 82nd Airborne Division. He also served with the Ordnance Section, Seventh Army and as Chief of Systems Test Division, White Sands Missile Range.*

The Publications Department's Role in Proposal Preparation

William Luke Moore

Proposal preparation is perhaps the most exciting and the most gratifying of all the varied tasks of the Publications Department. It is also a most hectic assignment that demands a quality product in an extremely short period of time.

PROPOSAL DEFINED

Consider what a proposal is and what it means to a company. A proposal is a bid for business. It is a document of extremely competitive, highly technical sales literature. The proposal, more than any other single document, is representative of the best talents available in the bidding company. On the basis of the proposal, the company hopes to obtain a contract, to acquire new business, and, at the same time, to make a profit. In order to accomplish these aims, the company applies its most competent engineers, managerial personnel, and supporting facilities to prepare a proposal that will convey to the contractor, *"Our company has the talent, facilities, and experience to provide the best possible solution for your problem. We can design and/or make better equipment or provide a service at a better price than any of our competitors."*

Since the proposal is of such vital importance to the company, everyone working on it, especially the engineering service organizations such as Publications, will encounter an attitude of cooperation and appreciation on the part of Engineering and Management — an attitude that is noticeably lacking in many other phases of publications work. This attitude is based on many factors.

First, and most important, the proposal is a selling document representing the company. It must get results to pay for itself. Unlike other publication documents, it will be reviewed only by Management prior to acceptance, and it cannot be revised once it is submitted. If it is not accepted, or rather if it does not accomplish its purpose, it has resulted in a nonrecoverable expenditure of company money. In almost every case, the entire cost of proposal preparation is paid for by the submitting company. If it does not result in a production contract, its cost cannot be regained.

Second, when proposals are prepared, the engineering departments are very much aware of their need for the help of the Publications Department. Publications is no longer just a service department producing the required fringe of an equipment contract; it is now a vital part of a documentation team. Technical illustrators are needed to prepare artists' conceptions and other quality artwork from the roughest sketches and instructions. Writers and editors are needed to coordinate masses of text from various engineers and to produce a well organized publication with continuity and a sales approach. The production man has the tremendous job of coordinating and scheduling reproduction. His knowledge of reproduction costs and his scheduling of work to the printer can result in dollar savings, for proposals are always deadline items and may necessitate overtime or extra printing charges.

Other factors resulting in the cooperative engineering attitude are the currentness of the project, the complete involvement of all parties in the team effort, and the comradeship that develops on a pressure assignment. Another important factor is the fact that Publications has had past experience in the preparation of complete proposals, whereas the particular engineering specialist is only one part of the complete project.

So far only the generalities of proposals have been discussed. The specific tasks of the Publications Department involved in the effort have not yet been delved into. This background is quite necessary, for if one does not realize the importance of the coordinated task, he cannot fully appreciate the extreme effort and cooperation required of the Publications Department in getting the proposal out on time. There are seldom extensions of the deadline date. In the following paragraphs the actual proposal preparation will be discussed.

ORGANIZATION PLUS PREPARATION

After Management has evaluated the *Invitation to Bid,* attended the bidders' conferences, and decided

that the prospective customer is actually interested in letting a contract and not "brain-picking" ideas for his own use, certain management decisions regarding the proposal are made. The most important decisions affecting the Publications Department are the estimated budget, the scheduling of completion of stages, the selection of the proposal engineer, and the allocation of personnel.

Of immediate and prime concern to the publication manager is the allocation of his own personnel. He must select as his project leader a person who is fully acquainted with all phases of publications work; who is available to devote full time to the effort; and who can work under pressure. Above all, he must be one who realizes the magnitude of the project and appreciates the efforts of, and pressures on, the other members of the team, especially the design and development engineers. The project leader, knowing the situation, must be able to obtain cooperation and to meet schedules. The publication manager should also schedule the other department work so that additional people will be available when needed. This usually means that the entire department of a small company will be tied up for the last several days of the proposal effort.

Once the publications project leader has been selected, he should devote his full time to the proposal. In the early stages, only the project leader and occasionally an illustrator will be needed. The first task of the project leader is to attend proposal conferences and to become acquainted with the other members of the team and their specific responsibilities in the over-all effort. During the initial stage of development he will receive only small contributions from the engineers and will be able to prepare background material and to organize outlines, progress charts, and other guide material.

The project leader should also become thoroughly familiar with the *Invitation to Bid*. This document may specify a specific format or other publication requirements. It will familiarize him with the technical aspects of the proposal and will put him in the position to evaluate the attention to be focused on the work of the different engineering tasks. It will also serve as a basis of the abstract, the summation, and the purpose sections of the proposal. Based on the *Invitation to Bid,* he, with the cooperation of the proposal engineer, will be able to prepare a tentative outline early in the proposal program.

PRINTING COORDINATION

The proposal project leader should also work very closely with the publications production man, or the printer, to determine where reproduction costs can be reduced. In many instances, special covers may be required. Lengthy sections can sometimes be printed and held for collation. Once the printing costs are determined, the project leader should make every effort to work with the printer in scheduling work to minimize costs and to obtain the best quality finished document possible under rush conditions.

A typing and editing format sheet should be prepared since final typing will probably require additional typists unfamiliar with any publication format. The format should be based on two precepts: readability and ease of typing. Abbreviations must also be standardized as soon as possible, as should reference symbols, mathematical terms, and preparation of formulas. This guide matter should be distributed to all parties concerned before any final material is prepared. If possible, a meeting should be held to explain such standards. Personal meetings with the parties concerned are even more effective.

While engineering is in its early stages, the Publications Department can prepare such sections as: Company History and Background, Experience in Similar Projects, Resumes of Key Personnel, and Facilities. In a well organized department, this material can be lifted from a library and tailored to suit the particular proposal. If it is not available as such, it must be gathered from previous proposals or obtained from Management and from other departments. If such sections are lengthy, they can be printed in advance, as can separators, appendixes, and the previously mentioned covers.

By the time these tasks are completed, information should be coming in from the various engineering groups for editing. If it is not being received, a gentle prodding may be in order. Suggestions of methods such as tape recording, dictating, or consultation with a writer may speed things up. It should be explained that the engineers should not spend their time polishing their text — this is a Publications Department responsibility. Sketches and other material for required artwork must be received on time, and text should be received in time to prepare a "final rough draft" for Management review.

CONTENT PLANNING

Prior to receiving the bulk of the engineering material, a meeting of all the publication writers and editors should be held in which the technical requirements are described and the engineering approach to the equipment is explained. Special emphasis must be placed on the features which make the company's proposal unique. All items which are assumed to be better than a competitor's should be emphasized. The previously prepared guide sheets should be explained. A complete outline, preferably mounted on a board,

should be displayed. This outline will form the basis of a progress chart and schedule of assignments. An effort should be made to keep this progress chart current throughout the remaining weeks or days of proposal preparation.

The editorial and writing policy must also be defined. Since the level of intelligence and understandability of the proposal reader is high, the language of the text matter can be technical, and the level of functional descriptive matter will be considerably above that of most publication manuals. This does not mean that it can be filled with technical jargon or phrases that say nothing. The proposal reader will be confronted with proposals from many other bidders, and the more readable your proposal is, the more attention it will get. The technical content is of prime importance, and it must not be hidden in confusing language.

When the proposal effort enters its final stages, the role of the Publications Department becomes increasingly important. Scheduling of work must be carefully planned, based on work flow. Editing, typing, and proofreading must be coordinated to provide a smooth flow. The printer must receive material on schedule. The publications project leader will no longer be able to work on proposal writing or editing except in emergencies. He must now devote his full time to liaison among the various team members. He must coordinate the scattered sections. Available to advise and answer questions from the editors, typists, and proofreaders, he must at the same time assemble the parts into the complete manuscript. He should also be available to act as a buffer between the engineering and management personnel (who now have the time to add, revise, and interfere) and the publications personnel who are now overloaded with work. At the close of the day, it is usually necessary for the project leader and an assistant to stay a few hours after the rest of the department has left, in order to assemble the work done that day and to organize the schedule for the following day.

By keeping on top of the job during the last hectic days, the project leader will be in a position to collate the final proposal into a continuous publication by integrating the text sections, illustrations, and front matter. He will also be able to prepare the all-important abstract, since he is one of the few people in the company who has full comprehension of viewpoint and technical presentation of the proposal.

COMPLETION AND SATISFACTION

Only when the proposal is printed, bound, and packaged is the job completed. At this point, it is final and absolute. There is no time for hindsight or revision. If there are major errors, these can be brought to the attention of the customer by letter, but this notification of inaccuracies, of course, weakens the effect of the document. If the proposal task has been well organized and smoothly run, there should be no need for such corrections. All members of the proposal team should be able to sit back and relax.

One of the most satisfying experiences of a Publications Department is the delivery of a completed, printed proposal. The culmination of the work of a few months or weeks is represented by several hundred pages bound into a single document. Since the proposal is such a vital document, everyone producing a part of it takes personal pride in its result, and the Publications Department in particular is responsible for the presentation quality. Proposal acceptance by the potential customer is the final culmination of satisfaction experienced by the Publications Group. When the success of the effort becomes evident, the entire contributing team can rejoice in a job well done.Ω

About the Author . . .

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Scientific Abstracting and Indexing Services*

Randall G. Rice, Charles L. Bernier, and Dale B. Baker

It is appropriate at a time when new thought and progress are needed in methods of providing information to scholars that a group such as STWP should be concerned with documentation, a term which includes such work as editing, publishing, abstracting, library science, and information services.

In this discussion scientific abstracting and indexing services are represented as being primarily applicable to the field of chemistry. One may perhaps begin by defining the terms *abstracting* and *indexing* as applied to the scientific field. Abstracting consists in preparing concise summaries of original papers, patents, and books from the indexing point of view. Indexing consists in preparing an accurate guide to the ideas reported in such literature. As indicated by these definitions, the two operations are interdependent.

PAST DEVELOPMENTS

Types of Abstracting and Indexing Services.[1] There are two common types of abstracts, the descriptive and the informative. The latter type is considered to be the most useful and most difficult to prepare. It is difficult to prepare because the abstractor must be a subject specialist who understands the technical reports sufficiently to recognize what is new among the ideas presented. Promptness in publication of abstracts is also important. This and the coverage factor are prime considerations in judging the quality of the abstracting service. Other factors involved are methods of publication (journals containing full papers plus abstracts or abstracts only), type of abstractors (professional or voluntary), publisher (government, technical society, or private), languages covered, comprehensiveness of abstracts, and type of nomenclature. Comprehensiveness, promptness, and accuracy are probably the key factors controlling cost.

No distinct line can be drawn in the importance, so far as abstract service is concerned, between journals publishing full papers and those publishing only abstracts. Many chemical journals publish a limited number of abstracts along with full papers; there are relatively few devoted exclusively to abstracts. The current tendency is to publish separate abstract journals.

Prior to 1907, there was no one journal that provided abstracts for the entire field of chemistry. After 1907, *Chemical Abstracts* (*CA*) was begun as a separate abstract journal covering the world's chemical literature. For the period 1885 to 1907, a large percentage of the papers in chemistry could be located by examination of the six abstract journals of England, France, and Germany (*Chemisches Zentralblatt, Angewandte Chemie, Journal of the Chemical Society* (London), *Journal of the Society of Chemical Industry, Bulletin de la societe chimique de France,* and *Chemiker-Zeitung).* Since 1907, there have been several comprehensive abstract journals developed: *CA,* 1907- ; *Chemisches Zentralblatt* (1830 to 1919, pure chemistry only), 1919- ; *British Abstracts,* 1926-53; and *Referativnyi Zhurnal, Khimiya,* 1953- .

The British emphasize promptness in abstracting rather than comprehensiveness.[2] This development followed the abandoning of the old *British Abstracts* and resulted in the publishing of *Current Chemical Papers,* which consists primarily of titles and appears in a matter of weeks after the primary literature reports. The purpose is to help reduce the effect of the time lag between the publication of new work and its indexing in a major abstract journal. The time involved in acquiring journals, assigning papers, abstracting, and publishing a truly comprehensive abstract journal varies from three months to over a year. The average for *CA* is three to four months.

The British emphasis on speed and currentness proves practical only because of the availability of a compre-

*Presented at the STWE Sixth Annual Convention, Washington, November 17-18, 1958.

hensive chemical abstract service in English, namely *CA*, to supplement *Current Chemical Papers*.

In addition to the various types of abstracting services mentioned, there are certain services covering all scientific fields, e.g., *Bulletin signaletique* and *Referativnyi Zhurnal*. There are also services which cover only specific fields of science, e.g., *Physikalische Berichte, Nuclear Science Abstracts, Photographic Abstracts, Analytical Abstracts* (British 1954), *Crerar Metals Abstracts* (U. S. A. 1952), and *Rubber Abstracts*.

Regardless of the type of abstracting service, the value of the service is limited basically by the number and quality of the indexes provided by these services. As mentioned previously, abstracting and indexing are complementary and interdependent. It is obvious, then, that a reference work of any magnitude is little better than its index. The index is the key to the availability of the recorded information. In the field of chemistry, the following are common types of indexes: author, subject, formula, patent-number, organic ring, reaction, taxonomic, and organism. Classification of abstracts is not a substitute for indexes.

Completeness is usually attained in author, formula, and patent-number indexes. In subject indexes, however, it can only be approximated. Many so-called subject indexes are really indexes of words. Subject indexing requires a special skill, and it is unreasonable to expect satisfactory results from untrained personnel.[3] The subject index is the most important type in chemistry, as in most other fields.

Growth of Abstracting and Indexing Services. The problem of adequately abstracting the field of chemistry has grown more difficult because of increased complexity of the subject matter. This seems to be the case in all fields of science. Scientific publication has increased in volume about tenfold since 1909. Without the retardant effect of world wars and depressions, the increase would probably have been far greater.[4, 5]

The total current number of scientific publications has been estimated by E. J. Crane as 15,000 to 20,000, about 8000 of these being publications carrying papers of chemical interest.[6] Because of the importance of chemistry in so many fields of science, this high proportion of journals containing chemical papers is not surprising.

An analysis of the scientific activity of the countries of the world,[7] as indicated by their chemical activities, is shown in Table 1. This table reports the number of abstracts published in *CA* in terms of each country's percentage of the total abstracts from 1909 to 1956. The United States percentage listed for 1947 is misleading and is due to the inability to obtain foreign journals, as well as to the sudden increase of war-curtailed publication in the United States. Conclusions based on data from this table are: 75 percent of the abstracts in *CA* came from Europe in 1909 compared to 50 percent in 1956; nearly half of the chemical publications are now in the English language; and, next to English, Russian is now the second most prevalent language in reporting scientific achievements. (Up to 1930, German was the predominant language of chemistry.)

Table 1 — Abstracts Published in Chemical Abstracts[7]

(Percentages)

Country	1956*	1947	1929	1909
United States	28.4	41.8	25.8	20.1
USSR	13.5	8.2	3.4	1.2
British Commonwealth	10.9	11.6	13.5	13.4
Japan	10.4	4.4	3.7	0.3
Germany	8.4	3.1	26.9	45.0
France	6.0	8.4	7.0	13.2
Italy	4.1	3.8	3.0	1.2
India	2.4	2.0		
Switzerland	1.9	2.8	1.1	
Netherlands	1.3	1.7	2.1	
Austria		0.2	1.7	
All others	12.7	12.0	11.8	5.6

*Data are based on complete counts of abstracts except for 1956, which is based on a sample only.

Table 2 shows the relation between abstracts and periodicals as measures of a country's scientific activity. Abstracts are a more accurate measure of scientific activity than the number of periodicals. This is because the mere number of periodicals gives no indication of size of a particular publication, e.g., a publication may consist of only 10 pages. Periodicals in borderline areas of chemistry yield few chemical abstracts.

Because of the increase in the volume of scientific publications, the increased complexity of scientific subject matter, and the shift in the importance of foreign languages in science publications, there is a growing need for scientific abstracting and indexing services to coordinate their efforts.

The present magnitude of the operations of abstracting and indexing scientific literature is so large that some have wondered about possible waste from overlap of the various services. Any such service overlap is more apparent than real. Although the same paper may be the base for many abstracts, each abstract will deal with different fields of science, and hence may be greatly different in content. This situation leads logically to a consideration of some of the more significant current developments in abstracting and indexing services.

CURRENT DEVELOPMENTS

When there is continued world peace, countries with common languages cannot afford to offer individual com-

prehensive abstracting services in all major fields of science. Recent changes cited in chemical abstracting in England are an example of the reliance of one country upon another's comprehensive abstracting services. Increasing activities in educational and scientific groups of the United Nations also show awareness of the need for cooperation among countries to meet the growing problem of storing and retrieving technical information on a comprehensive world-wide basis. The following discussion concerns a few of the recent activities of the scientific abstracting and indexing services in the United States to solve some of these problems.

National Federation of Science Abstracting and Indexing Services (NFSAIS).[8] In January 1958, a conference of the major abstracting and indexing services of the United States was held in Philadelphia to consider mutual benefits obtained through cooperation and coordination of their activities. This conference was arranged by *Biological Abstracts*, with funds provided by the National Science Foundation. The founding services comprise *Aeronautical Reviews, Applied Mechanics Reviews, Bibliography of Agriculture, Biological Abstracts, Current List of Medical Literature, Engineering Index, Mathematical Reviews, Meteorological Abstracts, Nuclear Science Abstracts, Psychological Abstracts, Review of Metal Literature, Technical*

Table 2 — Abstracts Published and Periodicals Abstracted by Chemical Abstracts

(Percentages)

Country	1956		1946	
	Journals	Abstracts	Journals	Abstracts*
United States	25.6	28.4	27.2	41.8
British Commonwealth	11.0	10.9	12.9	11.6
Italy	7.6	4.1	3.7	3.8
Germany	6.7	8.4	10.4	3.1
USSR	6.2	13.5	7.7	8.2
Japan	6.2	10.4	4.4	4.4
France	4.9	6.0	5.2	8.4
India	2.2	2.4	2.2	2.0
Netherlands	2.1	1.3	1.8	1.7
Switzerland	1.8	1.9	1.6	2.8
All others	25.7	12.7	22.9	12.2

*Abstract figures for 1946 were not available, so the 1947 figures were used for comparison.

Abstract Bulletin, and *United States Government Research Reports*. The following organizations concerned with the problems of science abstracting and indexing were also represented: American Association for the Advancement of Science, American Geological Institute, American Geophysical Union, National Academy of Sciences, National Science Foundation, United States Joint Publications Research Service, and UNESCO.

The conference was organized into working groups to examine the mutual problems of cooperation and coordination of activities. A summary of the reports of these working groups follows.

Group on the Need for a Permanent Federation (G. Miles Conrad, *Biological Abstracts*, Chairman). Recommended establishment of a national federation of science abstracting and indexing services.

Group on Finance and Administration (R. L. Taylor, AAAS, Chairman). Recommended forming an interim executive committee to (1) develop a constitution and by-laws for the NFSAIS, (2) incorporate as a nonprofit organization, (3) search for a suitable executive officer, and (4) appropriate sufficient funds for the first year of operation.

Group on Abstract Editorial (Phyllis V. Parkins, *Biological Abstracts*, Chairman). Recommended that the organization serve as a coordination and information center for information about science abstracting and indexing activities throughout the world.

Group on Index Editorial (Charles L. Bernier, *CA*, Chairman). Considered techniques and theories of indexing and associated personnel problems (procurement and training).

Group on Production (Melvin Day, *Nuclear Science Abstracts*, Chairman). Concluded that present methods of manufacturing the abstract journals are adequate, but improvement should be sought in lowering costs and in speeding up of operations.

Group on Research (Karl F. Heumann, *CA*, Chairman). Suggested exploration of acquisition of materials (new sources and publications); optimum coverage (overlapping coverage); internal processing (new methods of processing of abstracts and indexes and equipment); increased use of graphic arts; improving modes of user access to primary publications abstracted and indexed (copyright problem); and studies on reader usage and needs, particularly new user services.

Data from a questionnaire mailed before the conference by Helen L. Brownson in the office of Program Director for Scientific Documentation, NSF, showed that in 1957, 400,000 articles, books, or papers were abstracted. The Russian effort during this period was estimated at 360,000. Estimates of the total number of abstracts believed to be ideal were 600,000, indicating a comprehensive coverage of about 66 and 60 percent, respectively. It was pointed out that the Russians are lagging in the matter of indexes; they are now in their sixth year of publishing a chemical abstract journal but do not yet have a subject or formula index.

In 1949, the United States output in the physics field was 131,000 abstracts per year. Adding the English and Canadian products, the total became 275,000. One can-

not omit the English services since American physicists depend primarily on a British abstracting activity for their physics data. The reverse is true in chemistry.

Mention must also be made of the International Conference on Scientific Information held in Washington, from November 16 to 21, 1958. The *Reprints of Papers for the International Conference on Scientific Information, 1958,* has a section titled "The Function and Effectiveness of Abstracting and Indexing Services," which is noted here briefly in the section which follows.

FUTURE DEVELOPMENTS

Now that a general picture of the status of scientific abstracting and indexing services has been presented, it is logical to consider what developments might be expected on the basis of the references presented.

One development of considerable interest to technical writers and editors concerns the preparation of author abstracts. These would provide a means for primary publications to assist in improving abstract coverage. As an extreme example of this, J. D. Bernal (The Transmission of Scientific Information: A User's Analysis, a paper in Area I, International Conference on Scientific Information, 1958), states ". . . it would be better to have a short, pointed paper of some two pages in the form of what has been called an informative abstract. This would be supplemented by a longer, more detailed paper, not printed or published, but available in duplicated, microfilm, or other modern method of reproduction to all those thought to be interested in it or who requested it."[9]

This idea makes abstracts the primary source of published technical material and imposes a very different concept in publishing scientific material.

Other possible developments of abstracting and indexing services are reported in the *Reprints of the Papers for the ICSI, 1958,* by Isaac D. Welt.[9] Welt suggests that the answer to the current "dilemma" of how to handle the ever-growing volume of scientific information is to publish a combined index-abstract. The end-product would be a series of handbooks in index format, or the combination of abstracts with the index format, constituting a hybridized index.

These ideas suggest marked changes in the editing and publishing of technical information.

Current information on overlapping abstracting services indicates that one possibility for increasing the efficiency in abstract coverage lies in coordinating the abstracting efforts in the various disciplines. The establishment of the NFSAIS promises a strong attack on this problem.

The need for coordinated effort among the abstracting services — not only of the United States but of the world — is evident. Scientific information communication transcends national boundaries; consequently it is desirable to cooperate on an international basis. UNESCO is already active in this field. It will take all the cooperation possible, however, to accomplish a satisfactory and comprehensive coverage of the world's technical literature.

It would seem that problems of this kind are best handled by private organizations which are considered outside of political pressure.

A word is appropriate here about the potential application of mechanization to abstracting and indexing problems. This mechanized approach is already being used on a small scale for specialized problems in certain limited areas. At *CA,* punched cards are used to arrange numerically the entries for the patent indexes, which are then set with Monotype. Wherever coding and numbers provide useful leads to information in abstracts, mechanization techniques may offer convenient methods of storing and retrieving technical information. Organic structures are capable of being expressed by notations.[10] Some of these notations are tion of machines to information retrieval in large fields amenable to mechanization.[10-11] However, the applica- of knowledge, and for convenient use by all scientists, is still beset by serious problems. The problem of bringing vocabularies of searchers and document selectors into coincidence is especially difficult,[12] but it will probably be overcome, bringing a "universal" language to bear upon the problem of supplying comprehensive, current, and accurate abstracts to scientists and engineers throughout the world. Ω

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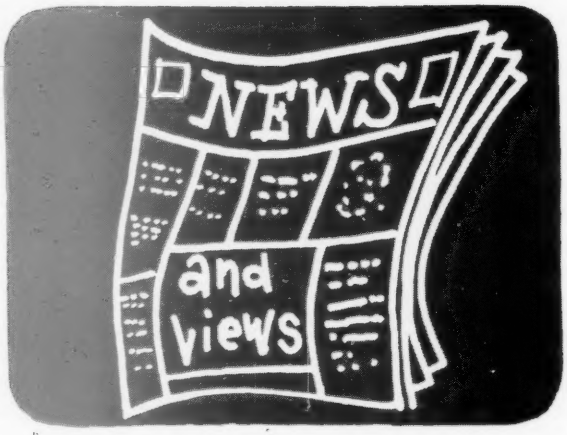
About the Authors . . .

RANDALL G. RICE *is Biochemical Indexing Department Head at Chemical Abstracts Service, Columbus, Ohio. He acquired his B.A. in chemistry at Pomona College and his doctorate in biochemistry at Stanford University. After working briefly as a postdoctoral fellow and an instructor at Cornell's Agricultural Experiment Station, Geneva, New York, he became a chemist with the U. S. Department of Agriculture in Pasadena, California in 1948. Six years later Dr. Rice left to join Chemical Abstracts Service.*

CHARLES L. BERNIER, *the Editor of* Chemical Abstracts *since 1958, has been associated with the journal since 1935. He became Assistant Editor in 1939, Associate Editor in 1941, and Executive Associate Editor in 1958. He has been instrumental in developing many of the methods now used by* Chemical Abstracts.

Dr. Bernier received his B.Sc. from Montana State College and his M.Sc. and Ph.D. from Ohio State University. He is a member of the American Chemical Society, Division of Chemical Literature; American Documentation Institute; Society of Indexers; American Association for the Advancement of Science; and the Committee and Commission on Codification, Ciphering, and Punched-Card Techniques of the National Research Council and the International Union of Pure and Applied Chemistry (IUPAC). He has worked with IUPAC Commission in Denmark, France, England, and Germany on the International Notation during the past few years.

D. B. BAKER *is Director of the Chemical Abstracts Service. He received his B.Ch.E. and M.S. degrees from Ohio State University. From 1938 to 1942 he worked for* Chemical Abstracts *as a student assistant and for the Du Pont Company from 1942 to 1946. He returned to* Chemical Abstracts *as Assistant Editor in 1946. He was made Associate Editor in 1951, Associate Director in 1958, and became Director on November 1, 1958. He is Chairman of the American Chemical Society's Committee on Exchanges; ACS representative on the ASA-Z39 Committee on Library and Documentation; and Vice President, National Federation of Science Abstracting and Indexing Services.*



By A. Stanley Higgins

USE FIRST PERSON?

In a recent issue of *Nucleonics,* Jerry Luntz and company have an offering that is of interest to technical writers and editors. The brief piece, which was printed in the front-matter staff column, follows:

> Among the technical articles in this issue is at least one which we editors feel would be improved by freer use of the personal pronoun in first-person plural, nominative case — commonly referred to as "we." It is most unfortunate that many scientists and engineers feel it wrong to use active voice when referring to their own actions in conducting an experiment or designing a reactor. It is a lot more to the point to say, "We decided to heat the vessel," than to say, "The decision was made to elevate the temperature of the vessel." The point we are making is not just a grammatical one — with more direct expression comes clearer, more forceful thinking.
>
> Some of the blame must be placed with freshman-laboratory instructors, who, as we recall, required us to write reports in a style that was almost as weak as the results we reported. But just as one grows beyond the measurement of a meter stick so we should outgrow stylistic bonds that leave one talking as if the scientific world had no people in it but only experiments that "are performed."
>
> We all face the problem of assimilating ever-increasing amounts of scientific and technical information. One way to ease the problem is to write more clearly and concisely. We on *Nucleonics* try to do that for you. It will help us if the scientific community overcomes its prejudice against personal pronouns. Why not say "We"? Why not, O brave architects of the nuclear future, even dare to say "I"?

Well put, I say. And look, I'm using the first person. However, I think there is a great deal of difference in the use of *I* in this column and the use of that pronoun in a scientific article. While I can go along with the use of *we* — sparingly, that is — in the technical article, I personally find the use of *I* repugnant in such context. To me it seems to lack the implicit coordination and integration of technical effort found in the so-called *editorial we*. Admittedly, in most cases the *I* is understood when the author uses *we*. I maintain, however, that since *I* adds no more directness and force to a sentence in the technical literature, there is really no point in preferring it to *we*. What do you think?

One other point about the *Nucleonics* suggestion. (Mind you, I agree in principle with the piece.) In the first paragraph there is a comparison that certainly is not valid. If the statement "We decided to heat the vessel" is to be rephrased to the passive, we cannot in fairness replace *to heat* with the wordy *to elevate the temperature of*. To allow a valid comparison, we would have to make the second statement read "The decision was made to heat the vessel." This sentence is still inferior, but how about going one step further in our rewriting. Certainly no thinking editor would miss the chance to revise the passive form to "The vessel was heated." That I'll buy in preference to the first-person statement.

HOW-TO DEPARTMENT

Do you ever find it necessary to mark some portion of a manuscript you are editing so that you can check a reference or reconsider some vague passage later? For years I had marked such lines with a paper clip. This method is unreliable, however, because a paper clip will often become attached to another page. I recently found that our librarians are well stocked with an excellent marker for my purpose. It is a brightly colored celluloid tab about ¼ inch wide by 1 inch long; it has a tiny metal clamp which easily slips on a sheet of paper or card. The librarian uses it — usually in red or green — to mark cards for special reference filing and the like.

Maybe this is nothing new, or perhaps you have something better. We'd like to hear about any devices, techniques, or procedures you've found helpful in your work. Most of us are interested not only in writing and editing, but also in graphic arts, printing, publication management, and other allied fields. We have over 3000 readers, and there's a good possibility that what has been useful to you will also be of value to perhaps even hundreds of our readers.

SOLICITING?

Does it sound as though I'm trying to get material for this column? I am. You don't have to write an article to become a contributor to the *Review*. Of course there's the Letters column, and we're always glad to publish the opinion of our readership in it. We can also use your help in the News and Views column. If you find an article, an editorial, or even a product announcement that you think will be of interest to others in the Society, please send it along. And remember, we have many different fields of interest in our readership. Technical publishing covers a wide variety of talents, backgrounds, and interests. What say we share?

Mail your contributions to me at the Westinghouse Central Laboratories, Pittsburgh 35.

(Continued on Page 31)

Technical Writers Who Became Famous as Scientists

Joel J. Shulman

Once in a rare while a person achieves stature as a scientist on the basis of work that is primarily a collection, classification, codification, or communication. Among these persons are some of the first rank in their fields: Linnaeus in botany and zoology, Euclid in mathematics, Franklin (to a degree) in electricity, men who were not necessarily original experimenters, but who advanced the state of science by their activities — sometimes with contributions more influential and conducive to greater progress than those of more original thinkers. Because American science has so many of these figures, this article will emphasize American contributions, but will also include other famous examples so obvious and important that they cannot be ignored.

Several of these scientists encouraged others to continue with work well started but flagging for lack of interest, background, or enthusiasm. Others provided literature of the field needed by the more original individuals whose contributions were limited but significant. These men provided the necessary background in the form of books, often sent at their personal expense, and especially letters which contained explanations of new developments much as written reports do today. Two such important figures, John Winthrop, Jr., and Peter Collinson, both associated with the Royal Society of London, were responsible for the tremendous interest in science in early America. Winthrop was the first governor of Connecticut, a founder of the Royal Society, and a close friend of Hooke and Newton. Collinson, the most important patron of American science during the first half of the eighteenth century, was a particularly unusual figure because he was not a scientist but a merchant whose ships traded with all parts of the world except the American colonies.

TECHNICAL WRITING IN 2000 B.C.

The first known technical writer of importance in history was probably Ahmose, an Egyptian scribe who lived about 2000 years before Christ. He wrote a mathematical treatise (the Rhind papyrus) which covered in some detail, and with extremely well thought-out organization, the important mathematical developments of his and earlier days. Ahmose described himself in the introductory lines as a humble scribe. This sounds much like the way a technical writer would describe himself if he wrote about a secret or semisecret topic. The use of mathematics in ancient Egypt was confined to a small group of highly placed persons and was closely associated with religious practices of the times, especially the building of pyramids and obelisks. That Ahmose was not a mathematician also seems evident from material included in his text. He wrote during the Twelfth Dynasty, but his material is known to date as far back as the Fifth Dynasty, a millenium earlier. This leads to the conclusion that Ahmose either had documents before him or referred to architects, builders, and others in the construction field for information concerning older practices which were still current. Our knowledge of the dating of this material comes from inscriptions in the most ancient sarcophagi and from small surviving bits of older documents.

Because of the apparent originality of the mathematics in the Rhind papyrus, Ahmose had for a long time been credited with total authorship of the work. Many important scholars of Egyptology and of the history of mathematics rated him one of the outstanding mathematical minds of history. However, more recent work, particularly the study of the internal structure of the writing and of other sources, indicates that Ahmose was almost certainly only a scribe, or possibly, if we are to be generous, a practitioner in the field who found it necessary to record what knowledge he needed during the course of his calculations. Of interest is the need for this codification of mathematical practices and procedures. Apparently the art of mathematics had advanced to a point beyond which it could be committed to memory by all or most active users. Since many of the accepted procedures were used only rarely (as can be seen from an inspection of the contents) a review of the procedures would have been necessary, much as a civil engineer today reviews his textbooks before pro-

ceeding on a major project, or the way a surgeon reviews his material before performing a major operation. Ahmose either was chosen to assemble and describe all literature on the subject, or he chose to do it himself with some assurance as to its need, and to reduce it to a single reference volume.

About 2000 years later, in Greece, the golden age of mathematics had brought a brightness to Hellenic culture never since equalled. Academies of learning had sprung up in almost all important Greek and Aegean city-states, and students were flocking to learn the new magical and religious mysteries of numerology, plane and solid geometry, and various theories of arithmetic. With such great strides as result from any concentrated effort, "professional" mathematicians found employment in the academies; among this number were some whose contributions to the newly expanded science were outstanding, and there were some who found their calling in pedagogy. Among the latter was Euclid of Megara.

MATHEMATICIAN, PRIEST AMONG WRITERS

Among the great names of Greek mathematics, such as Thales, Zenon of Elea, Democritos of Abdera, Hippocrates of Chios (not to be confused with Hippocrates of Cos, the physician), and others, Euclid was hardly significant. But as a teacher he was unsurpassed. Although he may have contributed in only a small degree to the scope of the mathematics known within his lifetime, his contribution as a writer, an author of a text, is most outstanding and long-lasting — more so than all the combined contributions of the more brilliant minds. The names of the progenitors of various mathematical achievements having been lost, credit for being the originator has been accorded, undeservedly, to Euclid. No doubt we owe him homage as a technical writer, but his fame as a great scientist is unfounded and unjustified, despite his service to science.

Again a lapse of about 2000 years, this time the scene is in Poland in the fifteenth century and in the field of astronomy. A Catholic priest had become interested in observing the motions of the heavens, and although still without a telescope or other magnifying instrument, he observed quite commendably. This priest developed an entire new theory of terrestrial and solar motion. He, of course, was Copernicus. But during his lifetime Copernicus did not publish a single book, tract, note, or letter. A book was apparently written in his name and was published, but it was not published by him. The great work of Copernicus was published as he lay dying. Although we know today that many of his important discoveries were recorded in his correspondence, this, too, was not published material. However, the aging Copernicus had a young assistant, George Rhaeticus, who may not have been a skilled astronomer, but he was a perfect disciple. Today we know next to nothing about Rhaeticus's contribution to the advancement of astronomy except for his published works. These, however, reflect the work of the master, Copernicus, and not of the student, Rhaeticus.

Rhaeticus, nevertheless, is ranked among the great mathematicians for his work on trigonometric tables. It is hardly likely that he would have obtained this stature were it not for his association with Copernicus. Rhaeticus is credited with having written the *Narratio Prima* in Copernicus's name. This was the first explanation of the new mathematics of astronomy that Copernicus used to establish his heliocentric theory of the solar system. It still preserved the ancient ideas of planetary movements in circles and epicycles. This, however, was only a small volume and expressed only the important ideas. The great work of Copernicus, *De Revolutionibus,* was probably stimulated and aided, if not actually written in some part, by young Rhaeticus, who handled its publication. He arranged for the printing, editing, and possibly even for the distribution to some of the more important public and private figures.

AGRICOLA, 'A GOOD RECORDER'

Of the same period, contemporary with Copernicus, was Agricola, who is credited as being "a good recorder"; so good, in fact, that his book, *De re metallica,* became a standard of geology and metallurgy and remained the standard reference work for two centuries. It may be that Agricola performed a scientific, as well as a writing, function, but in essence his effort was that of collecting, organizing, and presenting material without attempting to draw conclusions, make guesses, propound hypotheses, or, in general, to advance any notions or theories. The inclusion in this work of material on the manual tradition in mining, of instruments and tools, corresponds closely with like material that appears in operation, maintenance, and repair handbooks. Another major point of similarity with present-day handbooks is the use of illustrations, not as decoration, but as an integral part of the explanatory text. Agricola's insistence that learning by observation is superior to learning by reasoning is the same initial premise upon which all present handbook writing is based.

To a field such as metallurgy, which had its alchemists, its manual workers, its theorists, Agricola brought an orderly presentation and created a creditable reference source, usable by all participants in this type of activity, regardless of the particular levels of interest. To this work he added nothing not already known by many of his readers. However, his systematic collection and presentation made a significant contribution to the field and provided a basis upon which further work could proceed; this significant contribution was in large part due to the ability of the author to retain a dis-

interested attitude in commenting upon his chosen field. Agricola was not professionally involved (he was a physician) and was not so thoroughly knowledgeable in a single aspect as to distort his presentation by the interpolation of a point of view. It would be a great mistake to think of Agricola as a scientist or as anything but a gifted technical writer, and yet he is often called the father of metallurgy. It is obvious, from the point of view presented here, that this is an erroneous appellation.

Ranked among great scientists is one man who never performed an experiment, never devised an original hypothesis, never contributed a truly original idea to his field, and who made errors which were found and noted during his lifetime. This seems even more incredible when one considers the accolades accorded to him, Carl von Linné, or Linnaeus. Yet it would be manifestly unfair to do otherwise since he made a considerable and important contribution to the natural sciences. All this, however, was as a collector of information, a describer of obvious external features of the objects of his work, and a systematic organizer of this knowledge.

LINNAEAN SYSTEM VALUABLE CONTRIBUTION

In order to make a proper evaluation of the role performed by Linnaeus, many factors must be considered, not the least of which is the degree of confusion that prevailed in his day in the natural sciences, both in botany and zoology. Although the Linnaean system is no longer in use, for a long time it permitted the widest possible participation by novices in the field, especially in botany, because it was simple enough to be taught to them in a period of weeks. Throughout the world this simple system permitted advances in botanical taxonomy on a scale never duplicated. John Bartram, John Mitchell, and others in America made valuable contributions using this system with all its faults.

Therefore it can be considered that Linnaeus, despite his lack of theoretical and analytical endeavors, made a contribution as great, or greater, to biology by creating a tool without which few biologists could work and almost none could advance, this with due consideration given to imperfections of the tool. This tool was created by proper and consistent organization of related information and the publication of this material in a convenient form. Again, similar to the case of Agricola, Linnaeus is credited with being the father of scientific taxonomy, a title perhaps indicative of the respect with which his work is considered but certainly not a proper and duly earned title. Linnaeus was a technical writer, not scientist in the sense that many of his contemporaries were.

When the Royal Society was being formed in the 1640's and 1650's at Oxford, and before its formal organization as such, one of its leading members was John Winthrop, Jr. This young man was the son of the first governor of Massachusetts and was himself the first governor of Connecticut, a person of means and a good education. So popular was this Winthrop that when Charles II reascended the throne after the downfall of Cromwell, the Society resolved to move to Connecticut should the king fail to grant the group a charter. Because this group included Hooke, Boyle, Newton, and other less scientific minds with much more powerful commercial connections, the importance of such a decision could not have been lost on the king. He quickly granted a charter, despite the religious leanings of most of the members as well the Puritans, including Winthrop, toward the Cromwell camp. The promise by Hooke to use his influence to move members of the Society to Connecticut, should it have become necessary, would indicate a high regard on the part of these men for young Winthrop.

THE WINTHROP REPUTATION

Winthrop made several trips back to England and while there attended meetings of the Royal Society. He wrote only four papers which were published by the Society, and these described the natural history and geography of the new continent. They were hardly scientific pieces of the caliber of contributions by other members, such as Newton. On the basis of these few pieces of "scientific material" his contemporaries established for Winthrop a reputation as a scientist. Much of what Winthrop wrote is said to have been lost, possibly because it was unsigned and existed only in the form of correspondence which was subsequently lost. In any event, there is almost no evidence to support the contention that John Winthrop, Jr., was a leading scientist of his day, or, from the more recent vantage, even a significant scientific figure.

Half a century later another important member of the Royal Society, one who, incidentally, corresponded with Linnaeus, became intimately associated with American science. Although no particular fame has accrued to Peter Collinson as an original investigator, he is sometimes credited with having transmitted, in the form of correspondence, the theoretical foundations upon which several lesser scientists based their efforts. Collinson was a most persuasive influence on American science: he provided Franklin with his first electrical apparatus, he introduced John Bartram to correspondence with Linnaeus,* he introduced Americans to the most up-to-date English and continental scientific thoughts. His function in the field of science was as a technical correspondent. In performing his role as a correspondent, Collinson also acted as a clearing house of information

*Linnaeus called Bartram the "greatest botanist in the world." This meant, in effect, that Bartram had collected more new specimens than anyone else up to that time.

for his friends. He was able to compare the work of one with that of another, or all the others, and although he made comments upon the value of such work, he still remained sufficiently detached from the opinion to point out the "literature" of the field in order to direct a researcher along productive lines. It is these contributions which have allowed Collinson to be ranked among the more important scientists of the eighteenth century.

EARLY AMERICANS IN NATURAL HISTORY

Early American science had very few investigators who deserve the title "scientist." Most of the early work was in the field of natural history with descriptions of the natural endowments of the new land with its strange and new botanical, zoological, mineral, and scenic richness. Because of this, most of the significant contributions to early American science were in the fields of the biological sciences, especially botany.

The outstanding botanical figure was John Bartram, a Quaker farmer whose interest in botany brought him into contact with all the important American colonial scientific personages and dilettantes: Benjamin Franklin, John Mitchell, Cadwallader Colden, James Logan; and the most illustrious of the Europeans: James Petiver, Gronovius, Linnaeus, Sir Hans Sloane (founder of Kew Gardens), and others. He was honored for his work by King George III with an appointment as Botanist Royal for the Americas.

But as much as Bartram could be considered a "great" botanist, his work consisted of collecting, and sometimes identifying, items for his English patrons. By the time he became Botanist Royal he had passed his physical prime, and when asked by the Crown to make a trip to East Florida, he requested permission to take his son William; William, said the older Bartram, was as skilled as his father. The purpose of this most important of all of Bartram's trips was to learn the botanical and zoological wonders reported from this strange land recently obtained from Spain. Although Bartram was both botanist and zoologist, his main interest was in flora.

Of the son, less is known. He was hardly the figure his father was and seems to have been less competent in his art than his father, but he was sufficiently renowned to have Franklin call him "our celebrated botanist of Pennsylvania." Among William's contributions were several books in which he not only described the plants he wrote about but also illustrated them quite adequately. On the strength of his books, rather than on the high quality of his work, William obtained sponsorship for several expeditions and was offered the post of professor of botany at the University of Pennsylvania, which he refused. What we presently know of the work of William Bartram is sufficient to assure him no great fame as a scientist, and no high place of honor in American science. It is, rather, the lasting value of his writings that originally created his reputation. His most famous work was the report written for his father and which appeared in his father's name, having been thoroughly corrected and edited by the father.

FRANKLIN, JEFFERSON APPRAISED

It would be unfair to leave the name of Benjamin Franklin untouched by what should comprise a fair appraisal of his work. With due credit to Franklin for contributing what many consider the most important advance in physics in the eighteenth century (the theory of the fluid character of electricity) and with proper acknowledgment for his thoroughly new approach to scientific integrity, it must also be stated that much of Franklin's fame rests on his own statements of accomplishment.

In his less selfish moments, Franklin, a penurious, argumentative, critical person, gave credit to some of his colleagues for their parts in the experiments in electricity. However, since all of the correspondence was handled by Franklin, the accreditation of originality was at Franklin's whim, and this was not always exercised equitably. It is known, for instance, that Franklin was but one member of a group, including Ebenezer Kinnersly, Thomas Hopkinson, and Philip Syng, which performed most of the experiments spoken of by Franklin in his correspondence. Franklin admitted that the terms "plus" and "minus" to describe an accretion or depletion of electrical charges were the invention of Hopkinson. Kinnersly, the second most important member, actually devised many of the experiments performed by the group, and when advised by Franklin (says Franklin) to write a series of lectures, both wrote and delivered the lectures, for which Kinnersly earned sufficient money to support himself. At various times afterward Franklin claimed credit for having outlined these lectures . . . an unlikelihood in view of Kinnersly's obvious competence.

So great was Franklin's name that most of his contemporaries accepted his words at face value. That he served as correspondent and recorder for the group was not even thought of; he handled all the written material with much additional fame going to him instead of to the other three scientists. Although Franklin's fame as a great scientist rests properly on his own achievements, such as the kite experiment, some of the glitter would be lost with the general realization that all of Franklin's claims to scientific originality are not due him alone.

Among other outstanding scientific achievements, those of Thomas Jefferson are rated quite high. Anyone who has visited Monticello will attest to inventive brilliance of this famous Virginian. But this hardly constitutes testimony as to a scientific mind of exceptional perspicacity. This latter comes from a single book,

Notes on Virginia, a collection of notes on the natural history of Virginia and its adjacent regions. Jefferson published these notes after encouragement by the French government, which desired to learn more about the natural history of the states than was then available. The request for the history of Virginia reached Jefferson through persons who knew of his interest in natural history. Having collected and recorded many such notes over a period of years, Jefferson proceeded to organize them into readable form. Although poorly received in England (a result of Jefferson's unpopularity due to his part in the Revolution), they were hailed in France and in other countries as a scientific accomplishment of great merit. This reception was favorable despite obvious issue taken by Jefferson with some favorite ideas of the French naturalist, Buffon, the curator of the royal zoological park at Versailles. It was a passionate defense of the American scene and was certainly not a systematic study of natural history. But despite its chauvinism and its superficiality, *Notes on Virginia* has been able to raise Jefferson to the stature of scientist.

More examples will only serve to reinforce the knowledge that some persons, while performing essential roles as technical writers, have been able to form useful instruments which have induced or aided further scientific work. That some of these persons have become famous, not as writers but as scientists, attests to the importance of writing when it is timely and done well. It is not obvious to the reader that this form of scientific accreditation virtually ended with the beginnings of scientific work on a solely professional level, whether supported by colleges or by the fruits of the scientific effort. Once the amateurs in science were supplanted by the professionals, the need for technical writers, although greater, changed in form; a skilled writer became an adjunct to the scientific work, not part of it. When all of science was in the hands of part-time practitioners, the dependence upon writers was still not fully recognized, but those rare individuals who recognized the need for orderly presentations and provided them were honored by name when known. Of the many who performed in this area, only a few are known, and they are ranked among the greatest in science.

With the advent of the professional scientist, the professional technical writer was created. He was usually a junior member of the staff who doubled as a writer when not serving as a laboratory assistant or in some other quasi-apprentice capacity. There was still a little room for an amateur in writing as there was on the research level, but whereas the room previously had been as broad as the purview of the writer, it was now severely circumscribed. As time has gone on, room for the amateur has decreased, until now it is almost nonexistent. There may come a time when it will cease completely, but this is unlikely as long as there are some who find writing on scientific subjects interesting as a hobby, just as scientific writing was for many of the "great" scientists of the past whose fame rests upon their written contributions. Ω

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Rhetoric Applied to Scientific Method*

Daniel Marder

Phenomena are observed every day, but unless they can be formulated in terms of a problem, they remain aspects of our primeval world. Once man has asked the questions "What causes the sun to rise?," "What causes rain?," he was well on his way to an understanding of his universe. A clear perception of a problem is the first step toward scientific inquiry.

Isolating the problem lends unity to the investigation. A man doing chemical research does not research chemistry. He studies some aspect, such as carbohydrates, and studies this aspect with some purpose in mind, according to his interest. "What are all the kinds of carbohydrates found in natural petroleum?" The general subject plus the particular interest limits the problem. The interest limits and fixes the subject so that it is manageable. The problem is the subject brought to focus on a single question within some sort of limit.

ISOLATING THE PROBLEM

Often a group of phenomena is recognized as comprising a situation, but a problem cannot be formulated because the constituents in the situation do not hang together. The scientist is often in the midst of such things, and the problem itself is to formulate the question for scientific inquiry. Defining the problem, then, gives the researcher a purpose for his investigation.

Technical papers and reports also begin with a formulation of the problem which is often called objective or purpose.

Basically, the activities to be reported fall into two catgories, investigations and operations. Introducing reports of investigations, the writer includes the circumstances from which the purpose or problem arose, that is, the background leading to its formulation. These introductions may also include definitions of unfamiliar terms, very general descriptions of equipment and operation, if applicable, and the scope or range of the investigation. Reports on operations are often intended for instruction. They usually introduce the subject by telling what it is, what it is for, how it was developed, and how it is used. But the essential item in every introductory section, either in the investigation or operational report, is the purpose, or problem.

Here is a worthwhile introduction to a report of an investigation:

> The advances in the technology of missile guidance and propulsion have led to a number of proposals by agencies of the Department of Defense for small, unmanned earth satellites. Some of these proposals are based on techniques available under the current state of the art, while others look toward developments of the near future to provide means of placing larger and more useful satellites in an orbit around the earth. Although current technology would severely limit the size of the satellite and perhaps its use as a scientific tool for geophysical research, a minimum satellite project can be justified on the basis of experience to be gained in launching and tracking the satellite. The valuable data obtained could lead to a better understanding of certain geophysical phenomena. This Laboratory has conducted a study of the problems involved in instrumenting a minimum satellite vehicle.
>
> The prime objectives of the study were to determine (1) if tracking could provide proof that the satellite had been actually placed in an orbit, (2) if tracking with sufficient accuracy to meet the scientific objectives of the program was possible, and (3) if an electronic tracking beacon for the satellite vehicle could be designed.

The background is fully rendered so that the reader knows where he is in the scheme of things. The problem — the justification for a minimum satellite project — evolves from the background. The problem is then broken into three smaller problems, each stated explicitly as an area of inquiry. The reader knows where he is and so does the writer. In each of the three minor problems, the subject is brought to focus on a single question within some sort of limit.

The observations which lead the scientist or engineer to formulate the problem also suggest a tentative answer which we call a hypothesis or working hypothesis. The word comes from an old Greek verb meaning "to put

*Presented at the Army Chemical Center, Edgewood, Maryland, June 7, 1957.

under," that is, to support. Hypotheses, then, are placed under a collection of observed facts as a means of ordering them for investigation.

Before he arrives at the hypothesis, the investigator sifts through all available information pertaining to the problem so that all the work previously accomplished can be utilized, but not repeated. Perhaps someone has already solved the problem. Sometimes this preliminary search changes the nature of the inquiry. For example:

> For three decades, carbon monoxide combustion has intrigued investigators because of its extreme sensitivity to very small quantities of water vapor. The burning velocity of carbon monoxide is accelerated not only by water but also by hydrogen or by hydrogen-containing organic compounds. It is postulated that H atoms and possible OH radicals participate in the reaction. The presence of these H and OH species increases the reaction rate not only by heat conduction but also increases it by diffusion. Diffusing rapidly ahead of the flame, they act as individual ignition sources.
>
> W. Bone,[1] in his earlier studies, found H_2 more potent than H_2O in carbon monoxide combustion. He suggested that the relatively inert CO might be resolved into a more active state by the H atoms produced during combustion. Bone did a remarkable job in drying his CO over phosphorus pentoxide for 500 days, but in most instances, reliable data on the CO + O_2 system have been hard to obtain because the gases used were not dry enough. Usually a small amount of moisture is tolerated and more water added as a controlled variable.
>
> Many investigators, including Slootmaekers and van Tiggelen,[2] have collected data and postulated mechanisms for the CO + O_2 + H_2 or CO + H_2O reactions, and most agree that the reaction mechanisms are analogous to those of H_2 + O_2 because the CO does not enter into the first stages of ignition. Moisture in the CO, therefore, is a possible source of error in the data. Studying the kinetics of the reaction of stoichiometric CO and O_2 mixtures containing H_2, Buckler and Norrish[3] proposed a mechanism for the reaction at lower temperatures than those attained by flames. The moisture problem in the CO was not considered.
>
> In our investigation, the carbon monoxide, which was generated by formic acid decomposition, and the oxygen were carefullly dried and distilled. Beginning with the driest gases possible, effects of hydrogen on the flame velocities were compared with those of deuterium. The substitution of D_2 for H_2 gave velocity ratios, which are compared with the thermal or the diffusion theory, and a mechanism for the reaction of H_2 with dry carbon monoxide and oxygen has been postulated.

ATTACKING THE PROBLEM

After the hypothesis is formed, the investigator tests it by experimentation, which is observation under controlled conditions. The investigator carefully tries to avoid any bias in favor of the hypothesis. He never underemphasizes negative evidence. In fact, he tries to disprove his hypothesis by testing his own experimental methods of control. The results, or data, are then grouped, or classified. Unnecessary data are weeded out, and gaps usually appear which mean the investigator must return to the laboratory for more experimentation. The method is oversimplified here because we wish to examine the skeleton of the idea, not the complex details and frustrations of scientific method in operation.

Procedures or Methods. When the investigator turns writer, he again follows the method of his investigation. He has stated his problem and knows what he is looking for. The hypothesis is a statement of inquiry, regardless of its form.

The writer may know the answers when he sits down at his desk, and the whole process of technical writing would be greatly simplified if he could merely state them. But every reader comes from Missouri. The writer is required to prove his answer to the reader as he has proved it to himself. He presents the experiment or test which proved or did not prove his hypothesis. The reader who is also a professional engineer or scientist demands details of the procedure that was followed, of the experimental equipment employed, and of the control measures instituted.

Results. Finally, the writer presents the results — the data — and the reader should have all the evidence for evaluating them so he can determine for himself if the data are accurate and complete and if they actually bear on the problem as the investigator intended.

SOLVING THE PROBLEM

The last part of the scientific method is the interpretation of results. Do they support the working hypothesis or not? If no working hypothesis was formulated at the beginning, then the results cannot be applied. Quite often, however, scientific reports never state the hypothesis, or purpose, and therefore the results can have no specific meaning. Every reader wants an end to the story. If the hypothesis is clearly stated in the beginning, everything in the report can be related to it. In this way, the hypothesis, which is the statement of problem, assures unity, coherence, and the correct emphasis for the reader. It creates a flow of action which appeals to the reader's logic.

Evaluating Data. The proof or lack of proof for any scientific inquiry resides in the data. The ending of the investigation is the evaluation of the data in terms of the hypothesis. Here is where the problem is solved. Sometimes the data are simple, and the writer can proceed from the results directly to his conclusions. But usually interpretation is necessary. In reports of investigation, the interpretations of data are presented in sections called "Analysis of Data" or "Discussion." If the data substantiate the working hypothesis, then a new fact has been added to our store of knowledge: the hypothesis becomes an accepted gen-

eralization and may be dignified with the term "theory," although this term is reserved for generalizations which have a great weight of observed evidence to support them.

Drawing Conclusions. Whether the evaluation of data substantiates or disproves the hypothesis, the observed facts are generalized as a conclusion to the inquiry, and the writer inserts such statements in the concluding section of his report. When the data do not substantiate the hypothesis, the investigator may wish to reexamine the problem, to modify, restrict, or expand it. Rather than conclude the report, he may decide to postpone it until he has completed a second, and perhaps a third, investigation. Eventually, he either discards, retains, or restates his hypothesis to correspond with the data he has obtained. The statements in the conclusion are direct answers to the questions in the introduction. The ending of the inquiry and the report describing it are like the completion of a circle.

Recommending Action. In applied research and in most engineering projects, the investigation is often prompted by the need for action. In reports of such investigations, the ending includes a section for recommended action. The recommendations are always based directly on the conclusions. When the conclusions of an investigation do not verify the hypothesis, the recommendation may be to discard the project.

STICKING TO THE PROBLEM

The methods of science and exposition are parallel as we have seen. They both have a beginning, a middle, and an ending. In the beginning, the investigator conceives a problem from his observations and forms a hypothesis, a tentative answer; the writer states these observations as the situation or background from which the problem stems, and then he presents the hypothesis as the purpose of his investigation. In the middle, the investigator attacks his problem through controlled experimentation; the writer describes the experimentation step by step, giving procedures, equipment used, and results obtained. In the ending, the investigator evaluates his results and applies them to substantiate his hypothesis which may suggest a source of action; the writer presents the evaluation as an analysis or discussion of data and states the general conclusions stemming directly from the evaluation. He may also offer recommendations which are projections of the conclusions. The writer is always bearing on his problem. If the problem is the constant point of focus, then the writer can see which elements do not belong in his report, or in certain sections of his report, and he can also see how to fit the parts together. By emphasizing the problem, therefore, the writer achieves unity and coherence — the basic principles of rhetoric.

These principles of rhetoric are the natural means of organization in all mental work — in the systematic working of the human mind — whether that mind is operating within a scientific method or within the craft of writing. Ω

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Technical Writing Program Survey

Grace Pleasant Wellborn

This is a report of a study to evaluate the program of technical writing at Texas Technological College and to organize material for a textbook for technical writing. Questionnaires were sent to the land grant colleges and to eight additional schools. The questionnaires, mailed to both the schools of engineering and agriculture, were organized to obtain information on four topics: (1) status of technical writing in the curriculum, (2) textbooks, (3) analysis of subject matter in the course, and (4) other information about the course.

More than 90% of the 56 schools responded although some did not answer all of the questions. From some a reply was made for the engineering or agriculture program but not for both.

1. *Status of Technical Writing in the Curriculum*

Of the schools reporting, all except 8 offer a course in Technical Writing. One requires 6 semester hours of Freshman Rhetoric, 6 hours of English Literature, and 3 hours of Speech. One requires a course in Journalism for the aggie and Advanced Composition for the engineer; one requires Advanced Composition of both the aggie and engineer; one requires Speech of both groups.

In 12.5% of the schools for engineers the course is placed at the sophomore level; 32.7% of the engineering schools restrict the course to juniors and seniors; the other engineering schools open the course to sophomores, juniors, and seniors. A greater percentage of the schools of agriculture open the course to sophomores, juniors, and seniors, for only 7.8% place it in the sophomore curriculum and 30.8% restrict it to juniors and seniors.

The schools vary in the number of sections offered from 18 per semester at one college to one section on alternate years at another. The enrollment in sections varies from 15 to 30 per section with more than half of the schools restricting enrollment to less than 25. Only four schools enroll as many as 30 per section.

The total English requirements vary. Students in one university are excused from all English courses if they pass a proficiency test in English. Other schools vary in requirements from 6 to 15 semester hours. Percentages for schools reporting appear in the following tables.

Many of the schools reported that technical writing is an elective in some departments, a requirement in others. The tables on the next page show the requirements.

2. *Textbooks*

Textbooks include technical handbooks, rhetoric books, letter writing manuals, and collections of readings. Several professors noted that technical journals and magazines are used in the classroom. A bibliography of texts used in the colleges is given at the end of this article.

3. *Subject Matter of the Course*

Letter writing is included in assignments from more than 70% of the schools. More than half of the respondents listed technical descriptions and processes. More than half also require the informal report and nearly three-fourths (74%) require the formal report or research report. The abstract is assigned in 52% of the colleges. Listed under "Other Activities" on the questionnaire are oral reports (10%) and semi-technical and technical articles (21%).

4. *Other Information about the Course*

In the section labeled "Other Information about the Course" the respondents submitted personal evaluations of the course.

REQUIREMENTS FOR TECHNICAL WRITING

	No requirement but elective offered	Required of all students	Required by some departments	Total making some requirement
Aggie	53.8%	28.2%	18 %	46.2%
Engineer	36.1%	52.8%	11.1%	63.9%

ENGLISH REQUIREMENTS FOR AGGIES AND ENGINEERS

	Freshman English only	One course above Fresh. English	Two courses above Fresh.	Variable-dependent upon proficiency tests
Aggie	41.2%	17.9%	30.7%	10.2%
Engineer	31.7%	21.9%	21.9%	24.5%

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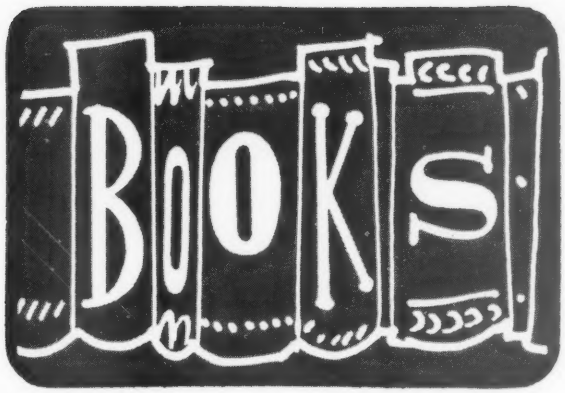
About the Author . . .

GRACE PLEASANT WELLBORN *is Assistant Professor of English at Texas Technological College, Lubbock, Texas and the co-author of two books on technical writing. Both are listed above.*



ANNIVERSARY CELEBRATIONS MADE EASY. D. Peel, 318 pages. Philadelphia: Chilton Company (1959). $5.00.

A great amount of painstaking research was undoubtedly accomplished by the author as a source for this book.

It may well be called a Bible for anniversaries and similar type occasions for various organizations, industries and communities, and the author has a plan for celebrations which cover a wide range of budget figures. All the necessary details for the successful planning of the occasion are included in the book.

Primarily, however, the book is slanted toward the larger anniversary promotional type organization and those companies who are able to afford "the best."

Many of the ideas contained in the book could be applied to other fields of endeavor in the everyday promotional-public relations work, and so the book could serve more than one purpose.

Portions of the book are too detailed and undoubtedly would be frowned upon by companies because of the time necessary to accomplish the steps outlined in this book. Management of various types of organizations—unless extremely promotional minded—might well find the program too extensive and expensive. Of course, certain portions can be deleted, allowing for the less costly and less time consuming celebration.

It might be said that the book can be used in conjunction with the service of any agency whose primary duty is planning such celebrations. Through the book, an organization would be able to determine whether the agency was using its full efforts to accomplish the planning, and also to suggest and guide in the event ideas were not forthcoming from such an agency.

Undoubtedly, the thinking behind the book—to help various organizations get the most from their anniversaries—was well meant, and the book is worth its price simply as a reference piece.

C. C. Hathorn

AIRCRAFT AND MISSILE DESIGN AND MAINTENANCE HANDBOOK. Charles A. Overbey. 352 pages plus index. New York: Macmillan (1960) $9.75.

This book shows a lack of understanding of the real problems of aircraft and missile design. By its title one has every right to expect that this would include material for the design and maintenance of both aircraft and missiles. It actually does not. The book has seven chapters each one of which is a random amalgamation of material obtained from handbooks, brochures, and catalogs gathered in such a way that it is extremely difficult to find particular items and after they are found, they are of very small consequence. For example, on page 8 there is a table devoted to the decimal and metric equivalent parts of an inch and this is followed by several additional pages which are devoted to basic trigonometry. Even this section is poorly presented.

The book is essentially the same all the way through and is far out of date on important items of aircraft and missile design such as stainless steel and aluminum honeycomb, ceramic materials, beryllium technology, and many phases of high temperature work.

This is a poor and misleading book.

Allan Lytel

HANDBOOK OF INDUSTRIAL RESEARCH MANAGEMENT. Edited by Carl Heyel. 505 pages. New York: Reinhold Publishing Corporation (1959) $12.00.

The Preface of this book poses the question, "Is science willing to turn the scientific method upon itself — developing and welcoming far-flung and expensive research endeavors, proven devices of organization, measurement, evaluation, and control?" If the scientist-reader can answer this question in the affirmative, *Handbook of Industrial Research Management* can be of considerable help in the business — the big business — of research.

The book is divided into five parts: Part I, Management Prospectives; Part II, Research Prospectives; Part III, Accounting, Control, and Evaluation; Part IV, Personnel Administration in Research; and Part V, Research for Governmental Agencies.

Addressed to top management, Part I deals with the determination of the role that the research laboratory will play in achieving the over-all objectives of the Company. It also covers the research organization.

Part II treats the establishment of research projects, executive direction of projects, departmental administration, and use of electronic computers. It is directed to the research director and his scientific staff.

Prepared primarily for the financial executive, Part III considers budgeting, cost accounting and control, and top management reports and controls.

Parts IV and V discuss problems of recruitment, training, and compensation. They were written for the research director and his administrative staff.

It is suggested that this book be read in its entirety before being used as a handbook. As a guide book, its purpose is to point out how many problems are interrelated. The solutions presented are given from the standpoint of *a* solution to a problem rather than *the* solution to a problem. Not only will the executives for whom the book was written find it helpful, but also many senior scientists could benefit by reading it.

R. W. Auxier

WRITING IN INDUSTRY. Siegfried Mandel (editor). 215 pages. New York: Polytechnic Press. (1959). $2.75.

The book *Writing in Industry* comprises eight papers delivered at a Conference on Writing and Publication; it is not one cohesive work developing basic themes. Its educational value is thus low — but it offers a few useful if isolated ideas. It also reflects the great confusion existing in the field of technical communications concerning writing versus editing.

The first chapter is "The Challenge to Writers in Industry" by S. Mandel, Professor of English at Polytechnic Institute of Brooklyn. The theme is simply that present-day technical writing is too technical, and that present-day scientists and engineers do not communicate to others in related fields. But the only solution offered — "the evidence is overwhelmingly in favor of more concentrated attention to writing" — is neither developed nor explained, overwhelmingly or otherwise. Mr. Mandel is not the first to say that the scientist and engineer should become a better writer. He should also become a better husband, father, citizen and human being, as well as a better technical worker. Such statements are too easy. There is little evidence that either more writers or more "reporters," which Mr. Mandel also suggests, are needed. There is evidence (the mass of material published daily) that we have too many writers and reporters today — and almost no editors who can take the words of the scientists and engineers (and writers and reporters) and transform them into understandable material.

The second chapter is "The Relationship of Engineering to Technical Writing" by R. Hamlett, director of training and personnel at Sperry Gyroscope. Mr. Hamlett says "engineers can write as well as doctors and lawyers . . ." and expresses sympathy and admiration to those choosing "technical writing" as a career. "There is no royal road to good writing . . . Give it all you have." This chapter has little value other than to remind us (by inference) that other professions also have their communication problems.

The third chapter is "Everyday Editorial Problems of an Engineer-Supervisor" by R. Ross, section head at Sperry Gyroscope. Mr. Ross says that engineers and supervisors must look out for "communication . . . technical content . . . organization . . . continuity and transition . . . clarity and brevity . . . inconsistencies . . . unnecessary and irrelevant material . . . company policy . . . conclusions and recommendations." Without more details and specific examples, few of which are given, these are only obvious generalities.

The fourth chapter is "Techniques and Practice of Proposal Writing" by D. Caldwell of Foster Wheeler Corp. This is the only practical chapter in the book. It is written by a man who obviously has prepared proposals, and he tells what should be included in a proposal. It will be of value to proposal writers.

The fifth chapter is "Writing for Publication: Why and How" by G. Wheatley, Public Relations Dept., Western Electric Corp. Reflecting the public-relations viewpoint of the author, the theme is that employers should assist their engineers and technical workers to be more "vocal." Except for a brief mention to the effect that editors stand ready to help budding authors (implying that there are editors somewhere in the picture), this chapter is written for those who have the problem of getting articles with p-r value out of a technical staff. This is certainly not as basic a problem as what to do with the excessive number of technical articles now being written but incapable of being understood by many readers.

The sixth chapter is "Production and Design Problem in Engineering Publications" by A. Eckstein of Eckstein-Stone, Inc. The subject is apparently "visual communication," and words are spoken about inserts and handleability, texture falsification, color, brightness, space-art, Gestalt, symbolism, laws of proximity and similarity, and optical illusions. The reviewer cannot understand for whom this material was written — writer, editor, production man or artist-illustrator. If these are production and design problems in engineering publications (the reviewer has never encountered them), they certainly are not the obvious or important ones.

The final chapter is "Journalistic Aspects of Science Writing" by W. Laurence of the New York Times. The only practical sentence in this chapter is "The good reporter who gets the exclusive story is the reporter who knows how to ask a question and sometimes to ask it in such a way that the man asked doesn't even realize the implication of the question." This may be a practical tip for budding science reporters. Except for this tip, the rest is generalization: Mr. Laurence concludes with "To my mind there is not a single American scientist who can write."

If this is true, what is the source for the 10 books, 50 magazines, 100 trade publications, 1000 house organs, 10,000 catalogs, and 10^{10} words of technical material published daily in the USA? What Mr. Laurence is trying to say is that American scientists write, but not well. Nothing in this book tells how to edit quality into a manuscript, the single greatest problem of the field.

The eight chapters may all have been good papers for a conference and interesting reading in a trade journal — but, except for the practical chapter on proposal writing, they do not warrant the permanence implied by a hard-cover binding. It is possible to take a series of articles or talks on one subject and edit them in such a manner that the result has book value, but the basic defect in this work is that every chapter is written for a different man and, except for the one exception noted, has little of practical value.

Milton H. Aronson

HI-FI MADE EASY. Norman H. Crowhurst. 224 pages. New York: Gernsback Library, Inc. (1959). $2.90.

Numerous books are now being published about hi-fi — how it works, how to put a system together, techniques and what not. Most of these books are crammed with circuit diagrams, speaker layouts and jargon which are enough to scare any neophyte away.

Such is not the case with *Hi-Fi Made Easy;* there are no circuit diagrams (not even in the chapter on circuits) or speaker layouts, only cartoon pictures liberally sprinkled throughout. As Mr. Crowhurst points out, "Some of the pictures are there to help give the idea. Others are just humorous quips triggered by the words, mostly unrelated to the subject matter."

Terms, such as frequency response, distortion, and dynamic range, are simply explained in individual chapters at the beginning. Then the author goes into the whys and wherefors of radio, records, pickups, microphones, speakers, woofers, tweeters and stereo. The cartoons are what make this book appealing both to the beginner and advanced hi-fier. The neophyte will learn the meanings of the "dry-sounding terminology of high-fidelity jargon," and will be able to enjoy himself more.

Richard A. Hanousek

PRINCIPLES OF BUSINESS COMMUNICATION. Robert L. Shurter. 579 pages. New York: McGraw-Hill Book Company, Inc. (1957). $8.00.

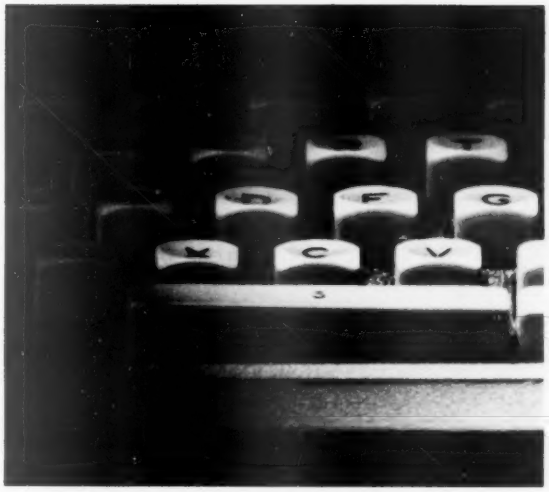
Last summer at an STWE meeting, Noel C. Cappetini, Manager — Commercial Systems Development at IBM, enthusiastically praised this book as one of the best ever written on business communications. After reading the book, I heartily agree.

In writing this book, the author, Dr. Shurter, was influenced by two questions frequently asked him by business executives:

Question: Why don't our employees attain higher standards for performance in writing?

Answer: Dr. Shurter feels that there have been no clear performance standards. The solution is to set a standard and to continually measure individual performance against the standard.

Question: Why are so many people in business reluctant to write?



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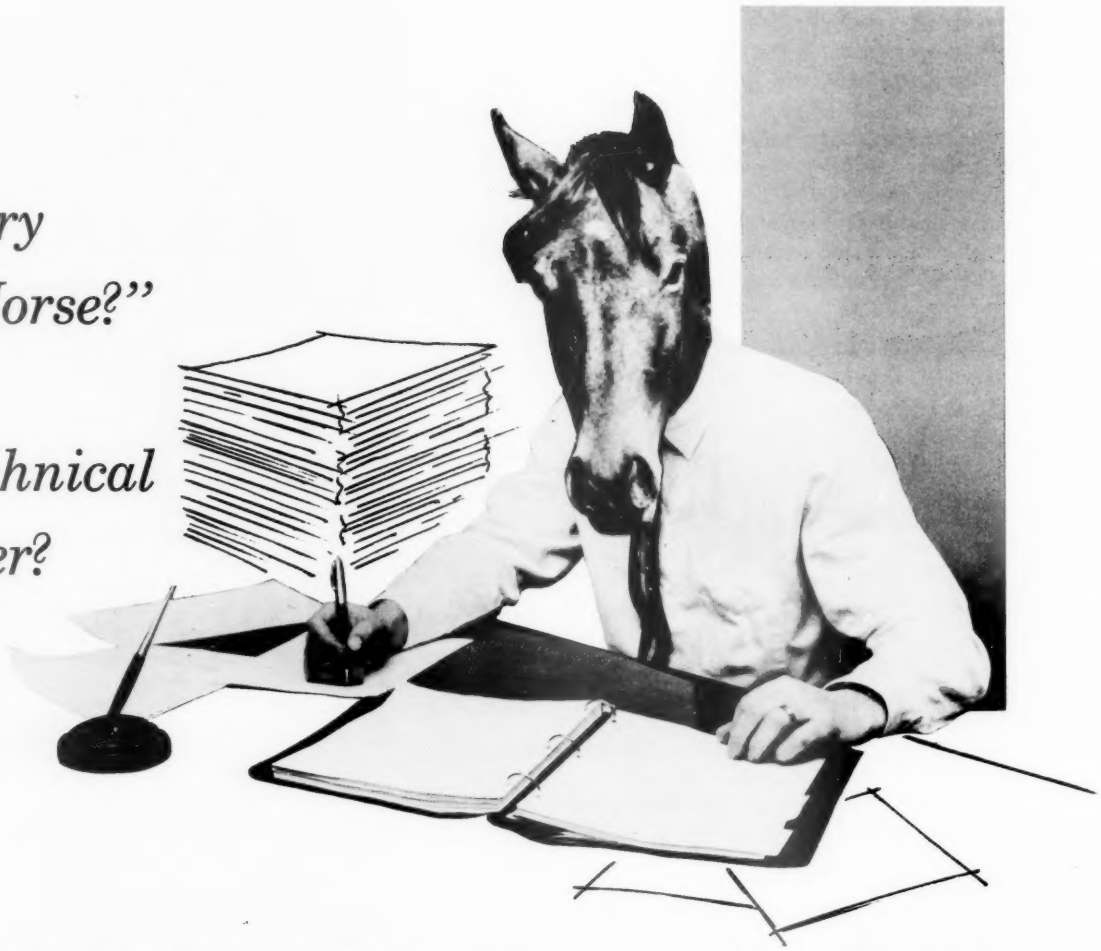
"Harry the Horse?" or a Technical Writer?



THIS is not "Harry the Horse" studying a racing form. Rather, it is our idealization of a good technical writer and his distinguishing characteristic—horse sense. We know of a great many characteristics we'd like in technical writers; but this is the only one we seem unable to get along without.

Do you have an engineering or science degree with literary emphasis? Or on-the-job technical writing experience? Or a flair for translating functional diagrams into prose? Or have you swallowed H. W. Fowler and Bergen Evans whole? Good. Horse sense, too? Wonderful! Maybe you'd like to share our stable.

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Answer: Writing reveals the writers ability or inability to think. Dr. Shurter believes that business people should be made aware of the thinking patterns involved in the transfer of information. This awareness makes writing easier and better and thus removes the source of writer reluctance.

To help the writer clarify his facts and ideas, Dr. Shurter discusses goals and styles of business communication, business letters, memos and reports. Other sections are self-development on the job, realistic business projects, and a useful reference on grammar and punctuation. The text is written informatively and entertainingly and is sprinkled liberally with amusing anecdotes by some of the world's greatest authors.

Dr. Shurter defines style and tone of a written communication as good manners. For clear forceful writing, he stresses using the active voice, short words, short sentences and paragraphs, and specific expressions. Business Jargon or gobbledygook must be avoided.

Dr. Shurter is a Professor of English and Director of Humanities and Social Studies at Case Institute of Technology. He has been retained as a consultant or lecturer in communications by such firms as National Cash Register Company, Chesapeake and Ohio Railway Company, and International Business Machines Corporation.

This book is invaluable to the college student and the person in business. Every phase of business communication is discussed, for example, credit and collection letters, sales letters, and letters of application. Dr. Shurter's approach to report writing by-passes the traditional system of classification and emphasizes thinking patterns that help the writer get the facts across to the reader.

B. E. Sweet

NEWS AND VIEWS

(Continued from Page 16)

HATS OFF TO CONVENTION PLANNERS

The convention has been over a long time, but the memory of its success still remains. Ed Rabin, Bob Craig, and the many other tireless workers who were responsible for that success deserve our most heart-felt congratulations. The well-rounded program, the excellent choice of convention headquarters, and the smoothness of the whole affair provide a high standard for next year's convention planners to live up to.

SUMMER CONFERENCE TIME AGAIN

The staff and guest faculty list of the Tufts University and the Colorado State University conferences this summer looks like an STWP Who's Who. Included in the staff of the Tufts Fifth Annual Technical Writers and Editors Workshop, which will be held July 11 and 12, are Paul H. Flint, Francis H. Archard, John V. E.

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Hansen, Hyman Kana, Sydney F. Shapiro, Robert K. Schnitzler, and Kenneth A. Young . . . The Institute in Technical and Industrial Communications will be held at Colorado State from July 11 to 15. Among the faculty members will be Warren Deck, Richard Dodge, Allan Lytel, Frank M. Van Sickle, Dwight Gray, Willard O. Eddy, Roy C. Nelson, and Herman M. Weisman.

OUR ENGLISH COUNTERPART

The English equivalent of STWP, the Technical Publications Association, is making history, or so it seems from the following item which appeared in the April 1960 issue of *Wireless World*:

For what is believed to be the first time in this country a responsible and qualified body, viz., the City & Guilds of London Institute, is holding examinations in technical authorship. They are being held in May and are the culmination of a long period of planning between the Institute and the Technical Publications Association. The two papers to be set aim at testing candidates' knowledge of the principles and practice of technical authorship and their skill in technical writing and editing.

The principal objects of the T. P. A., which now has a membership of just under 300, are: "To promote the advancement and improvement of technical publications techniques . . . and to promote and maintain a recognized status for its members." Its offices are at 46, Brook Street, London, W. 1.

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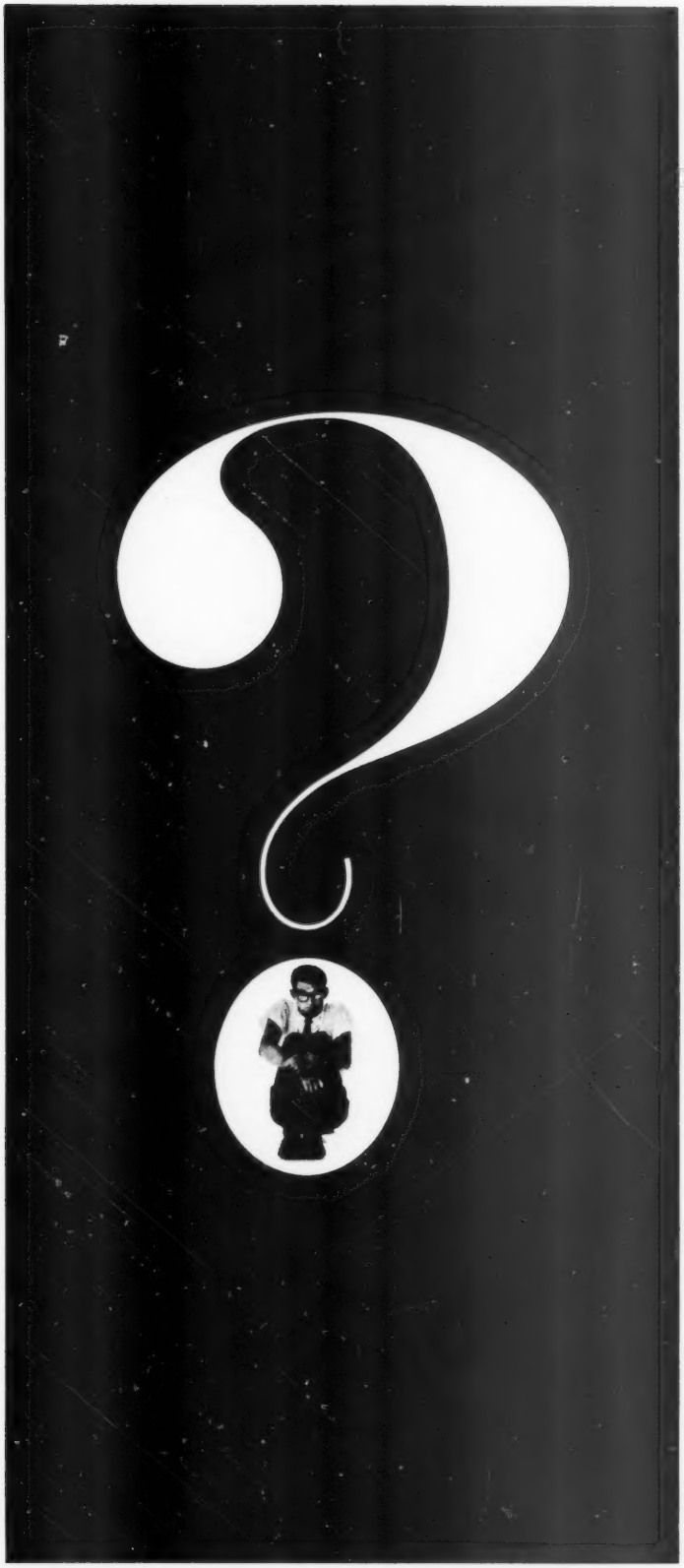

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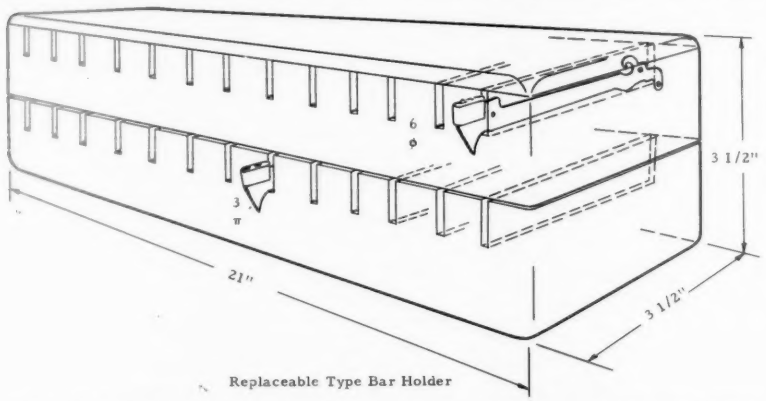
LETTERS

(Continued from Page 2)

To Editor, *STWP Review:*

Virginia Brennan's article ("A Method of Cataloging Changeable IBM Type Bars") in the October issue was of interest to us because it concerns a problem for which we too have found a solution. The Bendix Systems Division Model Shop was given the problem of constructing a type bar holder and came up with the structure shown in the accompanying figure. The boxes are constructed from two pieces of 2 by 4 in. boards. The top of each block is sawed into parallel grooves extending into the block about an inch. The grooves themselves are a little less than ⅛ inch wide and permit easy insertion and removal of the type bars. Two of the blocks are nailed together, each with the grooved side facing upwards,



Replaceable Type Bar Holder

and a strip is nailed over the top to finish it. The keys are inserted into the grooves from the front and extend the width of the block with a little overhang out the opposite side.

This block has several unique advantages: (1) it is extremely cheap and easy to make, (2) it can be set on any surface, and thus does not require that the typist sit beside a wall, and (3) it does not require special construction equipment (such as Linedex). Our block also has several disadvantages; chief among them is that the striking surfaces of the keys are unprotected and care must be taken when the box is moved or the keys may slide out. However, during the year these blocks have been in use, the keys have come to no harm, nor have we lost any.

Our method of labelling (see figure) is similar to Mrs. Brennan's. As we do not use special keys for subscripts and superscripts (our typewriters have half-space ratchets and can be rolled up and down a controlled distance), our three concerns are: (1) position on the typewriter, (2) characters on the key, and (3) number of units required for the symbol. (The units given in the figure are for an IBM typewriter equipped with Executive type.) We indicate the position not by the key number but by the number appearing on the keyboard (such as 8, which is key No. 27).

We have also compiled a table containing the Greek alphabet and all the mathematical symbols for which we have keys, together with the names of the symbols. The number of units required for each is listed beside the appropriate symbol. For instance, a line on this table would read:

A α - alpha (4, 3) { } - brace (3,3)

This table serves several purposes. First, it shows both the engineer and the typist what printed symbols are used on Divisional typewriters. Second, the typists learn the names of the symbols, which facilitates proofreading. Third, information on the number of units required for the large symbols which require back spacing (as only half the symbol is printed at one time) is readily available on this table.

Ruth Gross
Frances Schutzberg
Bendix Systems Division
Ann Arbor, Michigan

To Editor, *STWP Review:*

My plumber is a personable fellow and, though I don't like to pay him, I enjoy his visits. Compounding this pleasure is my new knowledge that he's a member of a profession. This I know because his technical "skill" and "success," his "conduct" and "attitude" bring him new assignments from previous patrons; because he's building a "body of knowledge" to pass on to his apprentices; because he "analyzes technical" bulletins and "interprets" them in terms of my building. My plumber is a professional, I know, because he fits Mr. McDaniel's detailed definition in the Editorial Notes of the *Review* for January 1960.

. . . Well, he almost fits; he lacks only (1) a "special code of ethics" and (2) need for "higher education" to do his work. Sad. Let's feel sorry also for farmers who've graduated from ag college but lack a "special code of ethics" — so alas we can never revere them as "professionals"; and for census enumerators whose ethic is respecting confidences but who needn't have college training — so they're not professionals, either.

Mr. McDaniel was introduced as explaining how technical writers "attain professional stature" and he did urge "higher education" upon us. But his several paragraphs about ethics lacked even one ethical precept; and his suggestions about being useful, influential, etc., pertain to any vocation at all.

Our status as professionals, then, remains abstruse.

Pending clarification, should we not wear a symbol? We could unite with doctors, lawyers, and clergymen to patent ourselves a sash, badge, or crown. Dentists, CPA's, and others would want into our cozy fold, but of course we'd repel them with slews of articles and committees and standards!

Vernon Steensland
417 Waverly Avenue
Syracuse 10, New York

To Editor, *STWP Review:*

The Washington Chapter on March 22, 1960, experimented to find out if psychodrama, a social science technique, can be used to improve author-editor relations. Many of the 75 members attending the meeting indicated afterward that writers and editors can use this technique to reach a greater understanding and appreciation of the role that each plays on the job.

Psychodrama is an audience-participation program aiming to help people handle interpersonal problems better. People bring their problems to the stage and act them out with the assistance of others. By acting out the problems and inviting discussion from the audience, they are able to secure greater understanding and often solutions for the problems.

The technique is an outgrowth of the work of Dr. J. L. Moreno, a New York psychiatrist. It had its beginnings in the 1930's and was used extensively in the treatment of mental illnesses during and after World War II. Though it is a discipline in itself, it incorporates the techniques of dramatics, psychiatry, sociology, and education.

James Enneis, supervising psychodramatist on the staff of St. Elizabeth's Hos-

pital in Washington, was on hand to supervise the meeting. According to Enneis, the role-playing technique of psychodrama has been successfully used in medicine, writing (especially fiction), interviewing, business, and management.

Michael J. Walker, of the Smithsonian Institute, and Jesse Ostroff, of the National Science Foundation, helped arrange the meeting, which took place at the National Housing Center in Washington.

Members of the audience were invited to the stage to play the roles of the author and the editor. The group was very cooperative. They dramatized and discussed some of the problems that they are faced with on the job. Enneis had no prior coaching or rehearsal of editorial and writing problems. He guided the skits and invited comments from the audience.

These points were brought out in the skits and the group discussion:

1. Much hostility exists when writers and editors come together in conference. The writer feels that he creates while the editor destroys. The editor feels that the writer is ignorant of the implications of what he has written. Thus each fails to appreciate the problems the other is faced with. Writers and editors play different roles on the job, and each should make an effort to understand and appreciate the role of the other.

2. Editors sometimes resort to tricks with writers. They sometimes try to "butter up" the author. They sometimes give long-winded speeches that cover up rather than clarify a problem. They sometimes forget that the writer is a human being and try to bulldoze him. Most of these practices are time-consuming and self-defeating. The editor should bring to the writer ideas on what constitutes improvements, and the editor should express these ideas tactfully and in as few words as possible so that the author is treated fairly.

3. The writer often provokes power-struggles with the editor. He refuses to accept necessary changes. This practice could lead to disaster for the writer. The writer is responsible for the writing, but the editor has authority to prevent the manuscript from being published. The editor acts for management in appraising the manuscript.

4. Some editors are hesitant to exercise supervisory authority. They feel that they are low men on the totem pole. They should find out from management what is expected of them.

5. Editors work with more than one writer on the staff. Limited in the amount of time that they can devote to manuscripts, editors become selective and devote more time to the more important reports of the laboratory. The writer should, however, seek as much help as he needs from the editor for all his writing.

6. The pains and rewards of creativity should be shared by both the writer and the editor. The writer and editor comprise a team that gathers and puts raw data into a style most acceptable to the readers. Communication is enhanced rather than hindered when the team functions properly.

7. Authors and editors are striving to enhance the communication process. They must understand each other. They must perceive what is taking place in themselves. If each appreciates and respects the other's role on the job, they will more likely communicate to each other and, later, to the readers.

Michael J. Walker
Program Chairman
Washington Chapter

To Editor, *STWP Review:*

You asked for suggestions for the *STWP Review* in the January 1960 issue, which, by the way, was a particularly interesting one from my point of view. I would like to see more articles on technical writing from the general semantics approach.

I particularly enjoyed "The Anonymous Technical Writer in History" and "Opportunities in Free-Lance and Ghost Writing." These were different, and I would like to see more of this type.

Another area of technical writing that some of us would find valuable is the preparation (writing, art work, and production) of sales type material, such as brochures. We were discussing this subject in our office and wished we could have the benefit of some Madison Avenue man's experience on good technical sales material.

Meta Ellis
Sacramento Chapter

To Editor, *STWP Review:*

I have read with interest Frank Smith's lead article on the future of the *STWP Review* in the January 1960 issue. While the Editorial Board is accepted as one of the best media for achieving reader participation in a periodical, Mr. Smith goes a step further in having it from the "horse's mouth," as it were. I am sure STWP readers will welcome the appeal and respond generously by offering suggestions for content within the limits defined by the Editorial Board.

Two topics on which guidance has been somewhat neglected come to my mind at the moment. One is the writing of book reviews and the other the writing of editorials or editorial notes. Some sort of guidelines could probably be evolved for the benefit of scientists and engineers. Many of the experts are often asked to do these jobs by magazine editors, but the effort is rarely commensurate with what the magazine or its readers would have desired. I hope one of your experts or eminent contributors will take up the suggestion.

Ram D. Taneja
Council of Scientific and
Industrial Research
New Delhi, India

To Editor, *STWP Review:*

Admirable is the essence of our editorial policy, set forth on page 6 of the *Review* for January, 1960. But I had myself a lark distilling off the excess words, improving the sequence, and eliminating the chimerical distinctions among "function," "objective," and "scope." Here's my paraphrase; I still doubt that we need the two passages in parentheses but, impudent as I am, I daren't revise liturgy:

The function of *STWP Review* is to inform, advise, and inspire the (professionals who are) members of STWP — members ranging from top managers and college professors through all levels and kinds of practitioners. To that end content is, roughly, of two categories:

The journal explains how its readers can do their jobs better. It analyzes principles of communicating and illustrates their application to problems both simple and sophisticated. In so doing it displays materials both established and of recent research — both from within the profession and from kindred fields: mathematics, linguistics, sociology, psychology, information theory, and educational methods. It helps expand, refine, and correlate the knowledge (which is the heritage of a true profession) passed down from initiate to novice, from teacher to student.

Secondly, the Review seeks advancement and recognition for STWP members — broadly by exploring ways and means and specifically by publishing historical and biographical sketches.

Criteria for any volume, then, include:

1. Does it contribute to the body of knowledge which will be handed down to the future?

2. Do parts of it represent most of the specialized occupational interests of the members?

3. Is part of it of general professional interest to the whole membership?

4. Does the presentation reflect credit on the profession?

With obvious modification, the above are proper measures of any issue of the *Review*, indeed of any manuscript offered it.

Vernon Steensland
417 Waverly Avenue
Syracuse 10, New York

This "bazooka" type cannon of 1395 fired lead, lapidary and finned missiles. Their main disadvantage — practically impossible to aim or guide to its target. The missile was named after Henry VIII because he was considered a connoisseur of walking sticks which were often used to conceal weapons.

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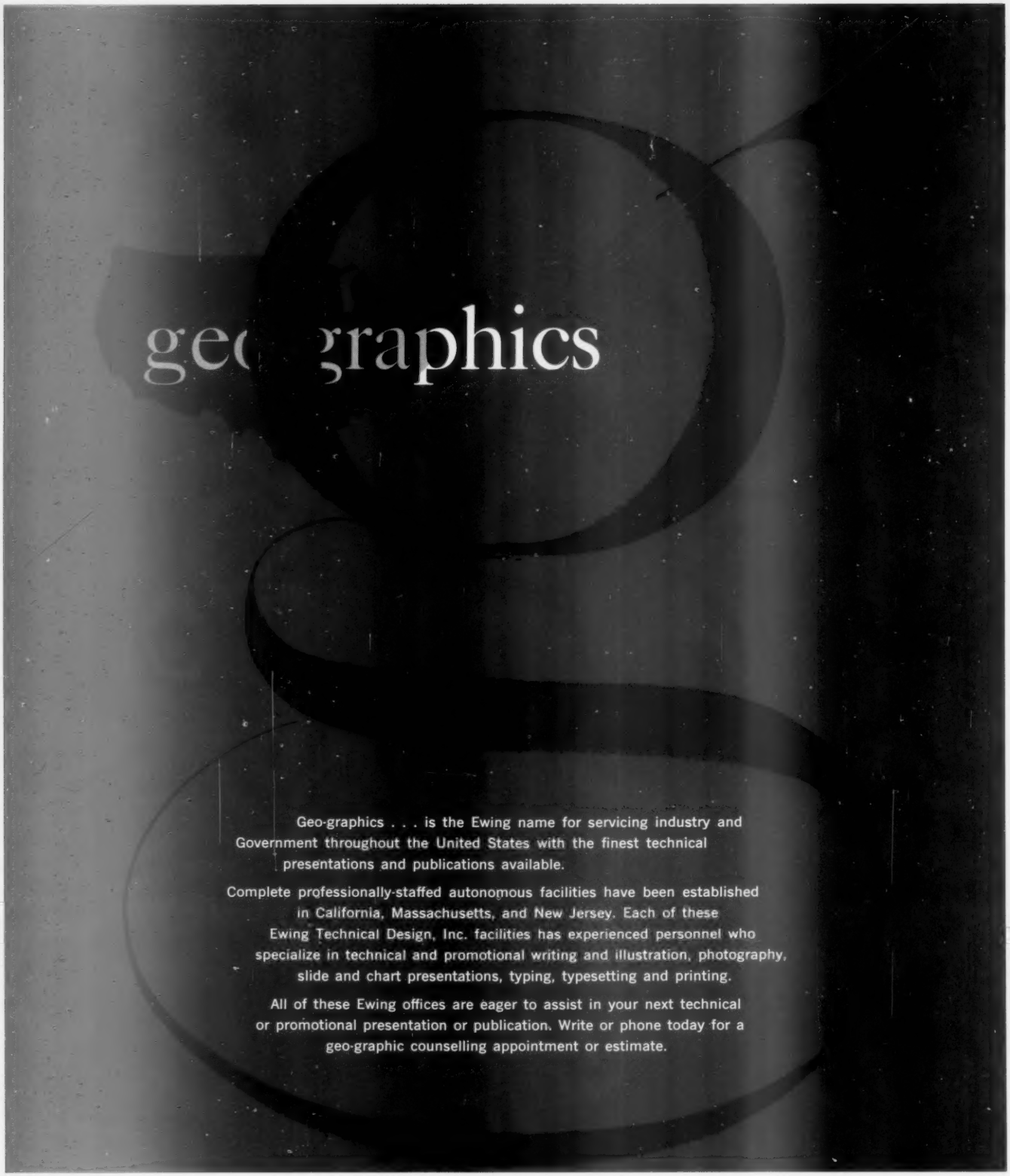

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